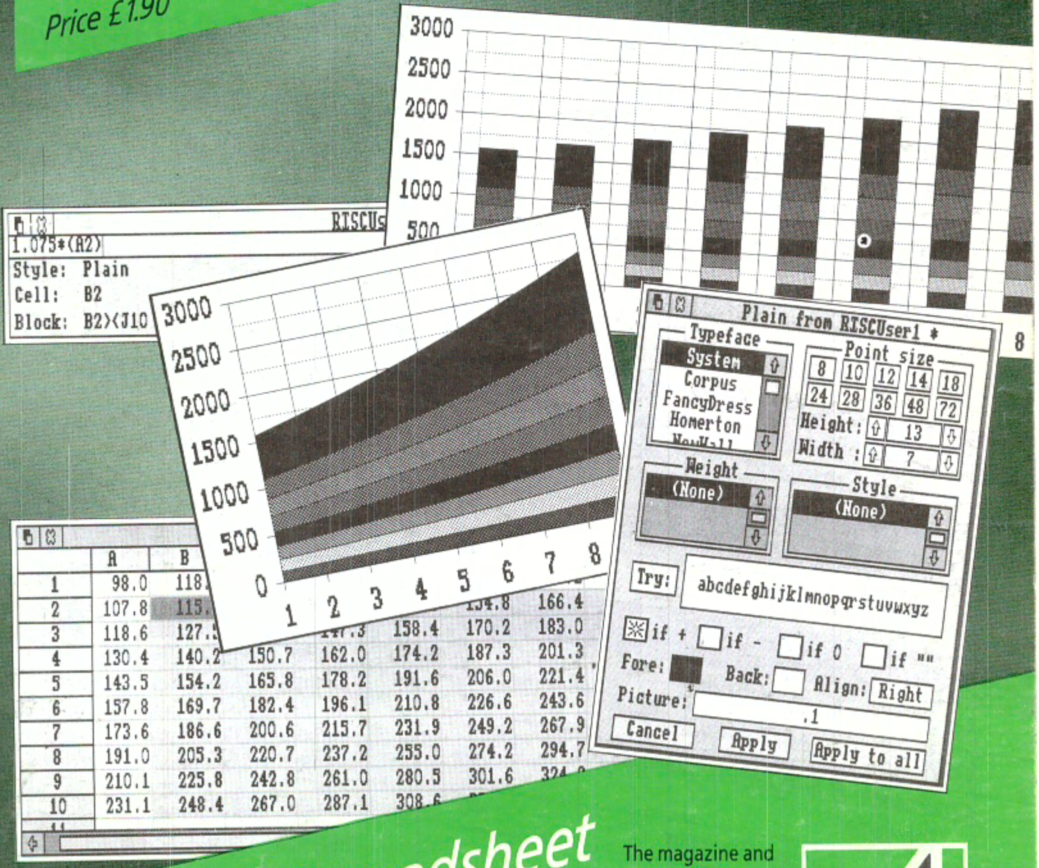
Volume 4
Issue 2

RISC USER

DECEMBER 1990
Price £1.90

Printer and Serial Buffer for the Arc
Desktop Command Controller
Three Dimensional Fractals
Inspiration — MIDI Sequencer



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1	98.0	118					
2	107.8	115.				154.8	166.4
3	118.6	127.		147.3	158.4	170.2	183.0
4	130.4	140.2	150.7	162.0	174.2	187.3	201.3
5	143.5	154.2	165.8	178.2	191.6	206.0	221.4
6	157.8	169.7	182.4	196.1	210.8	226.6	243.6
7	173.6	186.6	200.6	215.7	231.9	249.2	267.9
8	191.0	205.3	220.7	237.2	255.0	274.2	294.7
9	210.1	225.8	242.8	261.0	280.5	301.6	324.
10	231.1	248.4	267.0	287.1	308.6		

Schema — Spreadsheet

The magazine and
support group
exclusively for users
of the Archimedes

ISSUE
2
VOLUME 4
DECEMBER 1990

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RISC USER

THE ARCHIMEDES MAGAZINE AND SUPPORT GROUP

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EDITORIAL

COMPUTER SHOPPER SHOW

The second **Computer Shopper Show** takes place at the Wembley Conference Centre from 6th to 9th December 1990. Last year's Computer Shopper Show was enormously successful, and this year there will be a completely self-contained Acorn exhibition centre within the main show. Acorn itself has booked a large stand, and many other well known names in the Acorn market place will be there too.

BEEBUG will also be at the show, this time with two separate stands. RISC User magazine (together with BEEBUG magazine) will have its own stand to meet members and for sales of magazines and magazine discs. We will also be able to demonstrate RISC User software including **Moviemaker**, **Toolbox**, the updated **ArcScan III** and the recently released **Volume 3 Special Disc**. This will be available at its present members' price only until 31st December 1990.

NEW RISC USER DISCS

We also expect to have two further discs available, our first **RISC User Desktop Applications** disc, and a compendium of games, **ArcOmnibus**, to provide entertainment for all the family this Christmas. Both discs provide superb value for money, and will be sold to the general public (at a higher price), as well as to RISC User members.

BEEBUG PUBLIC DOMAIN SOFTWARE

RISC User members can also take advantage of the newly launched BEEBUG Public Domain Software Library. The first discs are now ready, and specific details are contained elsewhere in this issue of RISC User. All the latest BEEBUG PD discs will be on sale at the show, and available for demonstration.

BEEBUG SOFTWARE AND HARDWARE

BEEBUG's other stand (opposite that for RISC User) will be promoting BEEBUG's own range of software and hardware, including of course Ovation, BEEBUG's full feature DTP package. In addition a wide range of goods from other suppliers for the Archimedes (and BBC micro) will be on sale.

As a further attraction Acorn has arranged a programme of seminars (see advert in last month's RISC User), which look decidedly interesting and well worth attending. We have also arranged with Database Exhibitions, the organisers of the Computer Shopper Show, to include a voucher for 50p off the normal entry price to the show in this issue of RISC User. See you there.

RISC USER IN 1991

The next issue of RISC User will be that for the combined months of January and February 1991. Our current plans envisage that this issue will be sent out early in the new year. In the meantime, enjoy your computing.
M.W.

3 Exciting New OUTLINE FONTS

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CHINESE

Katyo

A Desktop PC READER & BACKGROUND TEXT PRINTER

Outstanding Value

£4.75 UNTIL THE 31 DEC. 1990

plus:

Sticky BackDrop places icons anywhere on the desktop

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(It is not necessary to refer to any magazines to take full benefit of this disc.)

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OGRE'S LAIR a highly entertaining arcade type game, providing hours of fun

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Order form. Please send me the RISC User Volume 3 Special Disc for £4.75 Stock Code 1406 ☐
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I enclose a cheque for £ ________ (all cheques must be in pounds sterling, drawn on a UK Bank) or:
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Name ______
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• News • News • News • News •

ACORN BREAKS EVEN

Acorn has just released its figures for the six months to 30 June 1990, and despite difficult economic conditions, the company broke even during this period. 1990 has seen a number of important product launches, namely the Learning Curve, the Archimedes Learning Curve, the R225 and R260 Unix workstations, and most recently the A540. The figures have therefore been affected by considerable investment in product development, and it is to be hoped that the new products will provide a sound basis for future profitability.

One significant feature to emerge from the results of the company's performance during the first half of the year is that the A3000 and Archimedes computers have now become Acorn's biggest selling products. Almost 100,000 units have now been sold since the Archimedes was first launched in 1987.

Details of all Acorn products can be obtained from Acorn Computers Ltd., Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN, tel. (0223) 245200.

COMPUTER SHOPPER SHOW

Further details of Acorn's plans for the *Computer Shopper Show* in December are now available. Acorn itself, together with all those companies supplying products for Acorn computers, will occupy a complete section of the Wembley Conference Centre. A major feature of Acorn's presence will be a wide-ranging series of seminars on subjects such as DTP, image processing, RISC technology, PC emulation, and music. Visitors to the conference will be offered vouchers which can be spent with Acorn exhibitors.

BEEBUG will of course be there to sell its wide range of Acorn products and demonstrate its own software, such as the popular DTP package Ovation. There will also be a separate stand for RISC User (and BEEBUG) magazines demonstrating for the first time *ArcScan III*, our new multi-tasking RISC OS version of ArcScan, the index to RISC USer and all the Acorn Archimedes manuals. This will also feature improved logic for searches and will be available as an upgrade to existing ArcScan II users for just £4.75. The full price, for members, remains at £14.95.

There will also be demonstrations of our other magazine products, such as the *Volume 3 Special Disc*, *ArcOmnibus* games collection, and other exciting new products which are in the pipeline.

The Computer Shopper Show will take place at the Wembley Conference Centre in London on 6-9 December 1990.

PIRATE RALLY

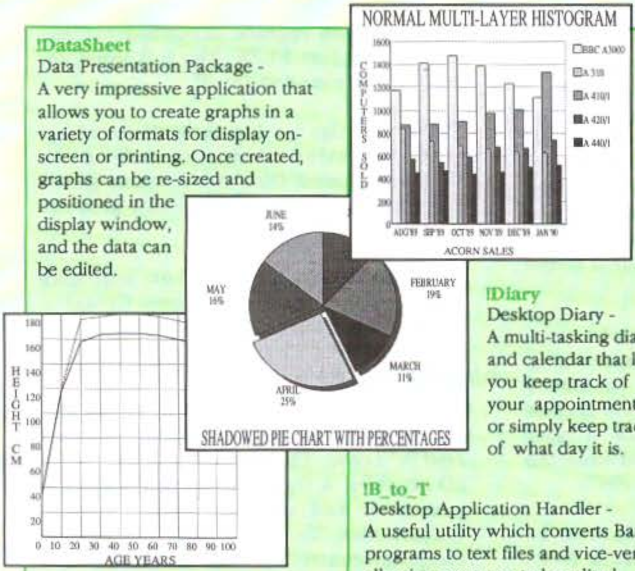
Pirate Software has announced a rally driving simulator for the Archimedes called *Fast 'n' Loose*. The package features filled 3D graphics, a fractal track and landscape generator and sampled speech for the course notes. You can either race against computer controlled cars, winning prizes and using them to upgrade your car, or you can race against your friends, each taking turns to complete the course. Pirate Software also plans to publish a new rally course each month, with real novelty prizes for the best times notified to the company. *Fast 'n' Loose* costs £17.50 inc. VAT and is available from Pirate Software, PO Box B126, Huddersfield, West Yorkshire HD1 1YH, tel. (0484) 652254. A free demo can be obtained by sending a blank disc and a stamped addressed envelope to the above address.

PREMIER JUNIOR

A cut-down version of the Premier 3 word processor is now available from Circle Software. Called *Premier Junior*, and costing £56.35 inc. VAT, it has all the features of Premier 3, but without access to the Premier Command Language. Also available from Circle are *Letter Filer*, which costs £17.25 inc. VAT and provides facilities for keeping track of all letters sent and received, and *Stock Control*, which features automatic re-ordering, stock value reports

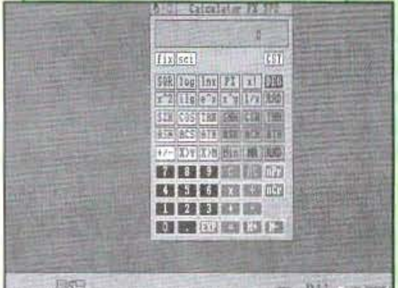
RISC User Desktop Applications 1

A disc containing a selection of some of the best multi-tasking desktop applications. Two new stand-alone applications have been specially written for the disc - a data presentation package **!DataSheet** (similar programs are sold commercially for about £50) and a multi-format print utility **!Print**, which has been developed in-house.



!DataSheet
Data Presentation Package -
A very impressive application that allows you to create graphs in a variety of formats for display on-screen or printing. Once created, graphs can be re-sized and positioned in the display window, and the data can be edited.

!Calc_570
Scientific Calculator -
A Desktop implementation of the Casio FX570 scientific calculator. It includes all the usual functions such as Sin, Cos, Log, Ln etc.



!CharDes
Character Designer -
This application lets you define new system fonts.

!Diary
Desktop Diary -
A multi-tasking diary and calendar that lets you keep track of your appointments, or simply keep track of what day it is.

!B_to_T
Desktop Application Handler -
A useful utility which converts Basic programs to text files and vice-versa, allowing programs to be edited without leaving the Desktop.

!FileFind
File-find utility -
A utility that can search a directory hierarchy for a given file, directory, or application. This utility is fully compatible with floppy and hard discs, as well as with Econet.

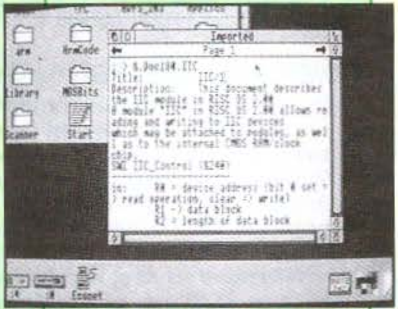
!SetType
Filetype Setter -
A handy utility that allows you to change the filetype of any file by dragging it to the icon bar.

!HotKeys
A Desktop hotkeys utility that allows single key presses to perform a wide range of functions, such as opening directory viewers, starting applications or saving screens.

!Mouse
Mouse-speed Controller -
A utility which allows the user to change the mouse speed merely by clicking on an icon. This can be particularly useful when a large degree of precision is required, without slowing down the mouse all the time.

!Print
Multi-format Print Utility -
A utility that allows text files, Basic program listings and Sprites to be printed by dragging them to the icon bar.

!NotePad
A Desktop Notepad application which allows up to eight pages of notes to be jotted down. The contents of the notepad can be saved for later reference, or printed out.



!Dustbin
Desktop Dustbin - A useful utility which allows files to be deleted simply by dragging them to the bin on the icon bar. Accidentally deleted files can be recovered by opening the bin and dragging them out, while multiple files can be deleted by selecting and dragging them together.

The RISC User Desktop Applications disc is available for **£9.95** to members Stock Code **PDA1**
Please add p&p (60p for UK, £1 for Europe asnd £2 for elswhere).

BEEBUG Ltd, 117 Hatfield Road, St Albans, Herts AL1 4JS. Telephone (0727) 40303 Fax (0727) 860263 etc., and costs £23.00 inc. VAT. A full accounting package is planned for release in the new year, and *Stock Control* will integrate fully with this. Details of these products can be obtained from Circle Software, 33 Restrop View, Purton, Swindon SN5 9DG, tel. (0793) 770021. A demonstration version of Premier 3 was included on the RISC User Volume 3 Issue 10 magazine disc.

FONTS GO INTERNATIONAL

Ładna czcionka będzie. Škoda piękna.

Ĉu vi parolas Esperanto?

"Ķųņopeļka ģŗ Über Allēs!"

Ştranğe und wuñderfóòl

The Electronic Font Foundry, publishers of a large range of outline fonts for the Archimedes, has started to convert some of its fonts for use with the Latin 2, Latin 3, Latin 4 and Latin 5 alphabets available on the Archimedes (see our article International Character Sets, Volume 3 Issue 10, for an explanation of these). This will enable users outside Western Europe to use DTP packages with their own alphabets. Fonts currently available in the new alphabets are EFF Times, EvenWriter, Poster and Swiss. Other fonts will be converted in due course. EFF is also working on Cyrillic, Hebrew and Arabic typefaces which it is hoped will be available soon. For further information contact the Electronic Font Foundry, Bridge House, 18 Brockenhurst Road, Ascot SL5 9DL, tel. (0990) 28698.

PINEAPPLE PAL

Pineapple Software has launched a PAL colour coder for the Archimedes. This device enables a high quality colour video signal from the computer to be recorded onto video tape or fed to a composite colour monitor. This opens the way for users to produce audio-visual displays using a video digitiser, and record them on tape. The coder is supplied as a small box which plugs into the RGB output socket of the Archimedes. The unit is completely external to the computer and no podule slot is required. The PAL colour coder costs £79.35 inc. VAT. For further information contatc Pineapple Software at 39 Brownlea Gardens, Seven Kings, Ilford, Essex IG3 9NL, tel. 081-599 1476.

USER GROUP

The West Sussex Archimedes User Group has recently been formed, and is interested to hear from other Archimedes users in the area who may wish to join. The aim of the group is to meet once or twice a month to exchange ideas on programming techniques, look at the software available and generally learn more about the Arc. The group can be contacted on West Chiltington (0798) 813855 or Horsham (0403) 66728.

EDUCATIONAL SOFTWARE

Longman Logotron has announced two new educational software products for the Archimedes. *PenDown* is a word processor that was originally released for the BBC micro, and was a popular choice in education. A pre-release version for the Arc has been available for a little while, and the full version should now be available by the time you read this. The software features among other things a range of outline fonts, a spelling checker and graphics capability. *PenDown* costs £62.10 inc. VAT.

Magpie is an authoring system which will allow users to create pages of text, graphics and sound and use them to compile a multimedia presentation or learning pack. It is claimed to be effective as a simple desktop publisher, and by using a sound sampler, digitised sound can be incorporated. A pre-release version of *Magpie* is expected to available at the end of November (no price has yet been fixed), and the full version some time next year. Longman Logotron can be contacted at Dales Brewery, Gwydir Street, Cambridge CB1 2LJ, tel. (0223) 323656.

Schema

Crosbie Fitch puts Clares' new spreadsheet under the microscope.

It's been a long time coming, but Schema might just be the definitive spreadsheet Archimedes users have been waiting for. Though it is the first spreadsheet designed for RISC OS, it is by no means the first for the Archimedes. Table 1 indicates that there have been many others already. In reviewing Schema, I was looking to see how much of a contender it is for the title of "definitive RISC OS spreadsheet". Such a concept certainly exists in the PC world. If you're familiar with spreadsheets I'd be surprised if you haven't heard of Lotus 1-2-3. It is widely regarded as the definitive PC spreadsheet and is so successful that competitors have had to copy some, if not all of its features.

SPREADSHEET	SUPPLIER	ORIGIN	ENVIRONMENT	REVIEW
1-2-3 et al	Lotus et al	PC	PC emulator	
ViewSheet	Acorn	BBC	6502 emulator	BB Vol.3 No.3
Intersheet II	Computer Concepts	BBC	non-Desktop	BB Vol.4 No.8
Logistix	Acorn	PC	non-Desktop	RU Vol.1 Iss.3
Matrix 3	Cambridge Microsystems	32016	non-Desktop	RU Vol.2 Iss.1
Sigmasheet	Minerva	Arthur	non-Desktop	RU Vol.1 Iss.7
Pipedream 3	Colton	Z88	Desktop	RU Vol.2 Iss.10
Schema	Clares	RISC OS	Desktop	RU Vol.4 Iss.2

Table 1. Spreadsheets for the Archimedes range

THE PACKAGE

Schema is packaged quite nicely in a black plastic case, inside which is a smaller one for the two discs. There is also a registration form, a Welcome Guide, and if you're lucky, a manual. At the time of writing the review, Clares did not yet have the manual available despite promises that it would be.

The program disc contains the Schema application and a configuration utility. The Utilities and Examples disc contains the latest revisions to the Acorn printer drivers, a Lotus 1-2-3 to Schema conversion utility (*sch123*) and a variety of example Schema spreadsheets. The printer drivers have certainly had significant enhancements, primarily in the handling of text files; facilities now exist to take advantage of printer features such as italics, underline, different character pitches and so on.

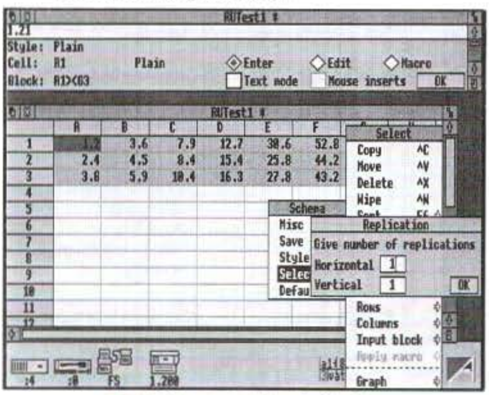
Installation is fairly straightforward - just copy everything from the program disc onto your working disc. Once installed, you configure Schema using the supplied utility which determines things such as whether the program should execute using overlays (for those with small amounts of memory), default page dimensions and initial sheet sizes.

USING SCHEMA

My system is a 440/1 with Atomwide VIDC enhancer, and is therefore not one of the fastest Archimedes configurations. I decided that Schema must have been written and tested on an ARM3, since loading a 189K Schema spreadsheet took about 2.5 minutes on my machine (in mode 12). The reason for the long loading time is that Schema files are in text format. However, once the spreadsheet is in the machine, Schema seems to be as fast in operation as 1-2-3. The authors of the package claim that recalculation timings are comparable to Microsoft Excel on a Macintosh SE.

A Schema spreadsheet can be up to 32000 rows by 32000 columns, though the number of cells which can contain data will obviously depend on the memory available in the computer.

Each sheet is displayed in a window, with optional row and column labels and grid. Columns can either be labelled numerically (1, 2, 3...) or alphabetically (A, B, C...). There is a separate cell contents editing window which gives the usual supplementary information about the cell under the cursor: contents, style and address. There are two cursors that appear on the spreadsheet: selection (yellow) and current (green). The current cursor (full slot size) highlights the current cell, and the selection cursor defines a range of cells.



1.2

Style: Plain

Cell: A1 Plain

Block: A1><G3

	A	B	C	D	E	F
1	1.2	3.6	7.9	12.7	38.6	52.8
2	2.4	4.5	8.4	15.4	25.8	44.2
3	3.8	5.9	10.4	16.3	27.8	43.2

Give number of replications

Horizontal 1

Vertical 1

Typical spreadsheet display

Moving around the sheet is quite straightforward. You can either use the cursor keys, or just point and click to move the current cursor to the desired cell. For longer distances, where window scrolling is not sufficient, there is an option to move to a cell specified by its address. A cell range is selected by using the pointer to drag a box over the required block of cells. Whole rows or columns may be more simply selected by clicking on the respective row or column label. The whole sheet can be selected just by clicking on the top left (blank) label. Input can be restricted to the selection range, with the added benefit of moving the cursor onwards automatically after a value has been entered.

A number of useful options are built in. For example, when filling a selected block of cells, you can choose cell references to be either absolute, or relative to the current cell position. You can also specify whether automatic recalculation is turned on or off.

There are the usual cell range manipulation commands such as Move, Copy and Delete. Note that since the destination can only be the current cursor, a separate Replication function is necessary if you want to duplicate cells. Cell range selections are also used to apply other formatting commands such as Sort, Protect, Change Style etc.

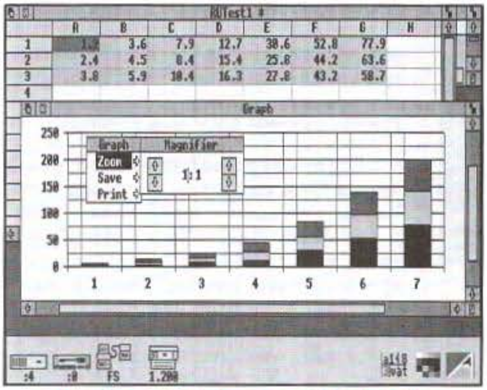
FUNCTIONS

There is a fairly comprehensive range of functions that may be included in formulae. Schema uses the following classifications: Algebraic, Array, Matrix, Financial, Statistical, String and Time. If you're worried that the functions that you need may not be included, then you can always use Schema's macro language facility to write your own functions.

From examination of the example macro files, the macro language seems to be fairly extensive, looking very much like a cut down Basic. The example source code was fairly well commented and spaciously laid out. Incidentally, database functions have been provided in the form of macros. As mentioned above, you can write your own macro functions, and add them to the menu selection within Schema, but it is not possible to construct your own customised front ends, as you can with 1-2-3.

Schema provides very comprehensive facilities to control the appearance of cell values. Rather than restrict control to a limited range of format types and a specified number of decimal places, for instance, there is a style editor that appears to allow an enormous number and variety of ways of displaying cell values. There is an initial list of the most common formats for displaying values, such as scientific, currency, percentage, date and time. You can either edit these styles or add some of your own. Each style has four sub-styles depending on whether the value is positive, negative, zero or text. It would have been nice if a sub-style could have been provided for cases where the displayed value is zero but the actual value isn't.

For each sub-style, you have full control over font, font size, lateral alignment, colours and picture. 'Picture' is used to describe the format of the displayed value. For example, (£.2) displays a number to two decimal places prefixed by the £ currency symbol and surrounded by parentheses. %dy would display the weekday according to the cell value if treated as a date/time value. The only formats I can think of that don't seem to be covered are histogram/unary (as in Lotus 1-2-3) and other number bases such as hexadecimal - but who needs these?



	A	B	C	D	E	F	G	H
1	1.2	3.6	7.9	12.7	38.6	52.8	77.9	
2	2.4	4.5	8.4	15.4	25.8	44.2	63.6	
3	3.8	5.9	10.4	16.3	27.8	43.2	58.7	
4								

Creating a graph from a marked section

As well as changing the style of their contents, you can place borders around cells or ranges (thus providing other effects such as underlining if only a portion of the border is drawn). Cell sizes can be controlled by specifying column width and row height for a range, and individual row/column sizes can be controlled interactively by dragging their label edges.

GRAPHS

Schema provides the user with a well balanced set of primary graph facilities - attractive and sophisticated, yet simple. Since graphs can be saved as Draw files, it should be quite easy to embellish them as required. Graph types are Bar, Line, Area, Plot and Pie. The first four can also be displayed in stacked form. All the expected features are provided: titles, legends, axis labels, grid. Features such as graph scaling, bar graph overlap and spacing are also available. As with the spreadsheet, the size of graph you can display is limited by the amount of memory available.

Graph to:	Printer (graphics) Draw file
Cell selection to:	Text file
Macros to:	Schema macro file
Selection Sheet to:	Printer (graphics) Printer (text) Schema file Comma Separated Values (CSV) file Draw file Formula listing file Text file
Workspace to:	Schema workspace file

Table 2.. Output file formats provided by Schema

Apart from use as a numbers processor, Schema, like most other spreadsheets, provides a comprehensive variety of outputs. Table 2 summarises these.

Apart from its own files, and CSV files, Schema will not import any other type of file except via conversion utilities such as sch123.

OTHER FACILITIES

Interactive on-line help is available, but only if you have the non-overlaid version configured; in other words, if you have sufficient memory for it. You can link any spreadsheet to any other, and by using macros you can have extensive control over this feature. "Hot links" to other software such as Presenter are not currently supported, but the facility may be added in the future.

USING sch123

I tried out sch123 on a 168K 1-2-3 spreadsheet, which it spent a couple of minutes converting into a 189K Schema file. sch123 certainly seems to be useful, but it doesn't go much further than converting simple formulae. Thus formulae which only involved simple cell references and well defined functions like EXP() and @INDEX() were converted successfully, but anything else was left as in the original but surrounded by double quotes. For example, functions like INT() and DATE() were not converted. I didn't detect any conversion of formatting (column widths, cell formats etc.), range names or graph definitions. It's just a bare bones conversion, it seems, and likely to require quite a bit of effort in tweaking and macro writing to effect a full translation.

CONCLUSION

I found it very frustrating trying to assess Schema fully without the manual. However, from what I've seen so far, being designed for RISC OS, Schema has to be the first, if not the only choice. I'm surprised it's taken so long, but it seems that the Archimedes has finally found its ideal spreadsheet partner. Bear in mind, though, that Schema is a new product, and almost inevitably I found a few bugs, some of them serious. One of the biggest problems in using early versions of major software packages is that, if they crash the machine, you may lose important data which is being processed by other programs. This did in fact happen with Schema under some circumstances. Like other RISC OS applications, Schema may go through a few versions before you can risk using it without needing to regularly save data being handled simultaneously by other applications.

Product	*Schema*
Supplier	*Clares Micro Supplies* *98 Middlewich Road,* *Northwich, Cheshire,* *CW9 7DA.*
Price	*£129.95 inc. VAT.* *(education £99.95 inc. VAT.)*

File Handling for All

on the BBC Micro and Acorn Archimedes

by David Spencer and Mike Williams

The first book published by BEEBUG!

File Handling for All is a comprehensive compilation of greatly enhanced articles by David Spencer and Mike Williams and offers 120 pages of text supported by a number of useful program listings. It is aimed at Basic programmers, beginners and advanced users, and anybody interested in File handling and Databases on the Beeb and the Arc.

The book starts with an introduction to the rudiments of file handling, and in the following chapters develops an in-depth look at the handling of different types of files e.g. serial files, indexed files, direct access files, and searching and sorting. A separate chapter is devoted to hierarchical and relational database design, and the book concludes with practical advice on developing file handling programs.

The associated disc contains complete working programs based on the routines described in the book and a copy of Filer, a full-feature Database program originally published in BEEBUG magazine.

File Handling for All is expected in December for **£ 9.95 Stock Code BK02b**
The disc supporting the book is **£ 4.75 Stock Code BK03a**
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A Printer and Serial Buffer for the Arc

by Nic Van Someren and Glynn Clements

In the third issue of RISC User, way back in 1987, we published a printer buffer program written by Nic Van Someren, and subsequently featured in the Van Somerens' book on the Arthur Operating System, published by Dabs Press. This program creates a relocatable module providing a variable sized buffer for printer output generated by the Archimedes. The great advantage of using such a device is that you can use the computer for other things while printing continues at full speed in the background.

We present here an upgraded version of the buffer, which traps error conditions more effectively, and which is now configurable as either a printer buffer, or a serial buffer. Extending the serial input buffer is particularly useful for comms applications. Characters can be received by the serial port at high speeds, and the default 191 character serial input buffer can easily be filled up if you are not using X-ON/X-OFF protocol or similar.

To make use of the program, type it in carefully, and save it to disc. When you run it, you are asked whether you require a printer or a serial buffer, and what its default size should be (answer in hexadecimal - e.g. 4000 (& supplied) will give a 16000 byte buffer). Then the appropriate module is created and saved to disc in the currently selected directory, with the name PBufMod or SBufMod as appropriate. If you require both a printer and serial buffer, you will need to run the source program twice.

Once the module has been created, you can install it with:

```
*RMload PBufMod  (or SBufMod)
```

If you now type *MODULES you should see it listed as "PrinterBuffer" or "SerialBuffer". The two commands associated with it are:

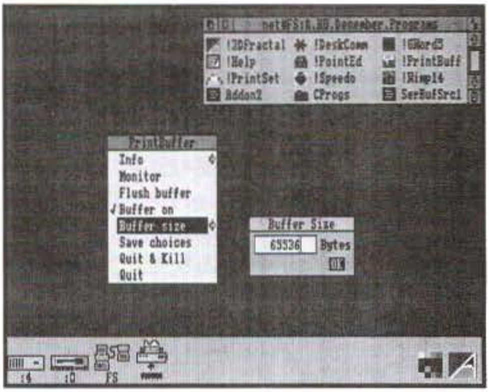
```
*PBuffer (or SBuffer) ON or OFF
```

and

```
*PBufferSize (or SBufferSize)
```

The buffer is off by default, and can be turned on and off with the first command. The second returns the current size of the buffer, or allows you to set a new size - eg:

```
*SBufferSize 4000
```



Buffer Size
65536 Bytes

This month's disc contains a useful Desktop application for controlling the printer buffer

will set it to 4000 bytes in length. The only limitation to buffer size is the amount of free memory. Finally, Alt-Escape will flush the buffer, as before.

This month's disc not only contains the source code for the buffer, but a special Desktop application for controlling the printer buffer from an icon bar menu.

```
   10 REM           >BufSource
   20 REM Program   Printer/Serial Buffer
   30 REM Requires  RISC OS
   40 REM Version   A 1.07
   50 REM Authors   Nic Van Someren
   60 REM           & Glynn Clements
   70 REM RISC User December 1990
   80 REM Program   Subject to copyright
   90 :
  100 PRINT'"Printer or Serial buffer (P/S)"
  110 s$=GET$
  120 serial%=(INSTR("Ss",s$) > 0)
  130 IF serial% THEN PS$="Serial" ELSE PS$=
"Printer"
  140 ps$=LEFT$(PS$,1)
  150 PRINTPS$" buffer"
  160 INPUT"Buffer size in hex bytes (Return
=16K) ? &"s$
  170 dsize%=&4000
  180 IF s$<>"" THEN dsize%=EVAL("&"+s$)
  190 :
  200 DIM Q% 4000
  210 FOR I=4 TO 7 STEP 3
  220 P%=0:O%=Q%
  230 [OPT I
  240 ; *** Module Header ***
  250 EQUD 0:EQUD initialise
  260 EQUD finalise
  270 EQUD service:EQUD title
  280 EQUD helpstring
  290 EQUD helptable
  300 EQUD &C0000
  310 EQUD MySwiHandler
  320 EQUD SwiTable:EQUD 0
  330 .title
  340 EQUS PS$+"Buffer"+CHR$0
  350 ALIGN
  360 .helpstring
  370 EQUS PS$+" Buffer"+CHR$
9+"1.07 ("+MID$(TIME$,5,11)+"
)"+CHR$0
  380 ALIGN
  390 .helptable
  400 EQUS ps$+"Buffer"+CHR$0
  410 ALIGN
  420 EQUD bufcommand
  430 EQUD &00010001    ;flags
  440 EQUD syntax
  450 EQUD bufhelp
  460 EQUS ps$+"BufferSize"
  470 EQUB 0:ALIGN
  480 EQUD sizecommand
  490 EQUD &00010100
  500 EQUD sizesyntax
  510 EQUD sizehelp
  520 EQUD 0
  530 .bufhelp
  540 EQUS "*"+ps$+"Buffer tu
rns buffer ON or OFF"
  550 EQUB 13:EQUB 10
  560 .syntax
  570 EQUS "Syntax: *"+ps$+"B
uffer <ON|OFF>"+CHR$0
  580 .sizehelp
  590 EQUS "*"+ps$+"BufferSiz
e without a parameter gives t
he size of the extra buffer"
  600 EQUB 13
  610 EQUS "With one paramete
r, the value is taken as the
new buffer size"
  620 EQUB 13
  630 .sizesyntax
  640 EQUS "Syntax: *"+ps$+"B
ufferSize [<size>]"+CHR$0
  650 ALIGN
  660 .bufcommand
  670 LDR R12,[R12]
  680 LDRB R2,[R0],#1
  690 ORR R2,R2,#&20
  700 CMP R2,#ASC"o"
  710 BNE badonoff
  720 LDRB R2,[R0],#1
  730 ORR R2,R2,#&20
  740 CMP R2,#ASC"n"
  750 BEQ setup
  760 CMP R2,#ASC"f"
  770 BNE badonoff
  780 LDRB R2,[R0],#1
  790 ORR R2,R2,#&20
  800 CMP R2,#ASC"f"
  810 BEQ setdown
  820 .badonoff
  830 ADR R0,bufneedonoff
  840 ORR R14,R14,#1<<28
  850 MOVS PC,R14
  860 .bufneedonoff
  870 EQUD &00123456
  880 EQUS "*"+ps$+"Buffer ne
eds ON or OFF after it"+CHR$0
  890 ALIGN
  900 .sizecommand
  910 STMFD R13!,{R14}
  920 MOV R11,R12
  930 LDR R12,[R12]
  940 CMP R1,#0:BEQ tellsize
  950 ADR R2,areweon
  960 LDR R2,[R2]
  970 CMP R2,#0
  980 BNE changewhileon
  990 MOV R1,R0
 1000 MOV R0,#10
 1010 SWI "XOS_ReadUnsigned"
 1020 BVS quit
 1030 ADD R2,R2,#17
 1040 LDR R10,[R12,#4]
 1050 MOV R9,R2
 1060 SUB R3,R2,R10
 1070 MOV R2,R12:MOV R0,#13
 1080 SWI "XOS_Module"
 1090 BVS quit
 1100 CMP R0,#13
 1110 BNE osmodulebug
 1120 STR R2,[R11]:MOV R3,R9
 1130 STR R3,[R2,#4]
 1140 MOV R3,#&10:STR R3,[R2]
 1150 STR R3,[R2,#8]
 1160 STR R3,[R2,#12]
 1170 LDMFD R13!,{PC}
 1180 .tellsize
 1190 SWI "XOS_WriteS"
 1200 EQUS "The extra buffer
is "+CHR$0
 1210 ALIGN
 1220 BVS quit
 1230 LDR R0,[R12,#4]
 1240 SUB R0,R0,#17
 1250 ADR R1,numbuffer
 1260 MOV R2,#11
 1270 SWI "XOS_ConvertCardina
l4"
 1280 SWIVC "XOS_Write0"
 1290 BVS quit
 1300 SWI "XOS_WriteS"
 1310 EQUS " bytes long."
 1320 EQUB 13:EQUB 10:EQUB 0
 1330 ALIGN
 1340 .quit LDMFD R13!,{PC}
 1350 .osmodulebug
 1360 LDMFD R13!,{R14}
 1370 ORR R14,R14,#1<<28
 1380 MOVS PC,R14
 1390 .changewhileon
 1400 LDMFD R13!,{R14}
 1410 ADR R0,changetext
 1420 ORR R14,R14,#1<<28
 1430 MOVS PC,R14
 1440 .changetext
 1450 EQUD &00123457
 1460 EQUS "Buffer must be OF
F before changing size"+CHR$0
 1470 ALIGN
 1480 .numbuffer
 1490 EQUD 0:EQUD 0:EQUD 0
 1500 .initialise
 1510 STMFD R13!,{R14}
 1520 MOV R1,R12
 1530 LDR R12,[R12]
 1540 CMP R12,#0
 1550 BNE startmeup
 1560 MOV R0,#6:LDR R3,dsize
 1570 SWI "XOS_Module"
 1580 BVS startmeup
 1590 STR R2,[R1]:MOV R12,R2
 1600 STR R3,[R12,#4]
 1610 MOV R3,#&10
 1620 STR R3,[R12]
 1630 STR R3,[R12,#8]
 1640 STR R3,[R12,#12]
 1650 .startmeup
 1660 LDMFD R13!,{PC}
 1670 .finalise
 1680 STMFD R13!,{R14}
 1690 LDR R12,[R12]
 1700 BL setdown
 1710 LDMVSFD R13!,{PC}
 1720 CMP R10,#0:MOV R0,#7
 1730 MOV R2,R12
 1740 SWINE "XOS_Module"
 1750 LDMFD R13!,{PC}
 1760 .service CMP R1,#&27
 1770 MOVNE PC,R14
 1780 STMFD R13!,{R0,R1}
 1790 ADR R1,areweon
 1800 MOV R0,#0:STR R0,[R1]
 1810 LDMFD R13!,{R0,R1}
 1820 MOV PC,R14
 1830 .areweon EQUD 0
 1840 .nextval
 1850 LDR R5,[R12,#4]
 1860 ADD R4,R4,#1:CMP R4,R5
 1870 LDREQ R4,[R12]
 1880 MOVS PC,R14
 1890 .isempty
 1900 LDR R4,[R12,#8]
 1910 LDR R5,[R12,#12]
 1920 CMP R4,R5:MOV PC,R14
 1930 .isfull
 1940 STMFD R13!,{R14}
 1950 LDR R4,[R12,#8]
 1960 BL nextval
 1970 LDR R5,[R12,#12]
 1980 CMP R4,R5
 1990 LDMFD R13!,{PC}
 2000 .topush
 2010 STMFD R13!,{R14}
 2020 BL isfull
 2030 LDMEQFD R13!,{R14}
 2040 ORREQS PC,R14,#1<<29
 2050 LDR R4,[R12,#8]
 2060 STRB R0,[R12,R4]
 2070 BL nextval
 2080 STR R4,[R12,#8]
 2090 LDMFD R13!,{R14}
 2100 BICS PC,R14,#1<<29
 2110 .topull
 2120 STMFD R13!,{R14}
 2130 BL isempty
 2140 LDMEQFD R13!,{R14}
 2150 ORREQS PC,R14,#1<<29
 2160 LDR R4,[R12,#12]
 2170 LDRB R0,[R12,R4]
 2180 MOV R2,R0
 2190 TST R6,#1<<28
 2200 BLEQ nextval
 2210 STR R4,[R12,#12]
 2220 LDMFD R13!,{R14}
 2230 BICS PC,R14,#1<<29
 2240 .toaltflush
 2250 STMFD R13!,{R0,R1,R2,R1
4}
 2260 MOV R0,#&81:MOV R1,#&FD
 2270 MOV R2,#&FF
 2280 SWI "XOS_Byte"
 2290 LDMVSFD R13!,{R0,R1,R2,
R15}
 2300 CMP R1,#&FF
 2310 LDMFD R13!,{R0,R1,R2,R1
4}
 2320 MOVNE PC,R14
 2330 LDR R4,[R12]
 2340 STR R4,[R12,#8]
 2350 STR R4,[R12,#12]
 2360 MOV PC,R14
 2370 .tocountpurge
 2380 TST R6,#1<<28
 2390 BNE toaltflush
 2400 STMFD R13!,{R14}
 2410 TSTP R6,R6
 2420 LDRCS R4,[R12,#8]
 2430 BLCS nextval
 2440 LDRCS R5,[R12,#12]
 2450 LDRCC R5,[R12,#8]
 2460 LDRCC R4,[R12,#12]
 2470 SUBS R1,R5,R4
 2480 BHI posspace
 2490 LDR R4,[R12]
 2500 LDR R5,[R12,#4]
 2510 ADD R1,R1,R5
 2520 SUB R1,R1,R4
 2530 .posspace
 2540 MOV R2,R1,LSR #8
 2550 LDMFD R13!,{PC}
 2560 .myinsv
 2570 CMP R1,#2:MOVNES PC,R14
 2580 STMFD R13!,{R0,R1,R4,R5}
 2590 BL topush
 2600 LDMFD R13!,{R0,R1,R4,R5
,PC}
 2610 .myremv
 2620 STMFD R13!,{R6}
 2630 MOV R6,PC:CMP R1,#2
 2640 LDMNEFD R13!,{R6}
 2650 MOVNES PC,R14
 2660 STMFD R13!,{R1,R4,R5}
 2670 BL topull
 2680 LDMFD R13!,{R1,R4,R5,R6
,PC}
 2690 .mycnpv
 2700 STMFD R13!,{R6}
 2710 MOV R6,PC:CMP R1,#2
 2720 LDMNEFD R13!,{R6}
 2730 MOVNES PC,R14
 2740 STMFD R13!,{R4,R5}
 2750 BL tocountpurge
 2760 LDMFD R13!,{R4,R5,R6,PC}
 2770 .setup
 2780 STMFD R13!,{R14}
 2790 ADR R1,areweon
 2800 LDR R0,[R1]:CMP R0,#0
 2810 LDMNEFD R13!,{PC}
 2820 MVN R0,#0:STR R0,[R1]
 2830 MOV R2,R12:LDR R0,[R12]
 2840 STR R0,[R12,#8]
 2850 STR R0,[R12,#12]
 2860 MOV R0,#&14
 2870 ADR R1,myinsv
 2880 SWI "XOS_Claim"
 2890 LDMVSFD R13!,{PC}
 2900 MOV R0,#&15
 2910 ADR R1,myremv
 2920 SWI "XOS_Claim"
 2930 LDMVSFD R13!,{PC}
 2940 MOV R0,#&16
 2950 ADR R1,mycnpv
 2960 SWI "XOS_Claim"
 2970 LDMFD R13!,{PC}
 2980 .setdown
 2990 STMFD R13!,{R14}
 3000 MOV R2,R12
 3010 ADR R1,areweon
 3020 LDR R0,[R1]:CMP R0,#0
 3030 LDMEQFD R13!,{PC}
 3040 MOV R0,#0:STR R0,[R1]
 3050 MOV R0,#&14
 3060 ADR R1,myinsv
 3070 SWI "XOS_Release"
 3080 LDMVSFD R13!,{PC}
 3090 MOV R0,#&15
 3100 ADR R1,myremv
 3110 SWI "XOS_Release"
 3120 LDMVSFD R13!,{PC}
 3130 MOV R0,#&16
 3140 ADR R1,mycnpv
 3150 SWI "XOS_Release"
 3160 LDMFD R13!,{PC}
 3170 .SwiTable
 3180 EQUS PS$+"Buffer"+CHR$0
 3190 EQUS "Control"+CHR$0
 3200 EQUB 0:ALIGN
 3210 .MySwiHandler
 3220 MOV R9,R12
 3230 LDR R12,[R12]
 3240 STMFD R13!,{R14}
 3250 CMP R11,#0
 3260 BNE BadSWINumber
 3270 MOV R11,R9:CMP R0,#3
 3280 ADDLE PC,PC,R0,LSL#2
 3290 B Bad_Opcode
 3300 B Return_Buffer_Info
 3310 B Adjust_Buffer_State
 3320 B Set_Buffer_Size
 3330 B Flush_Buffer
 3340 .Bad_Opcode
 3350 ADR R0,Bad_Message
 3360 LDMFD R13!,{R14}
 3370 ORRS PC,R14,#1<<28
 3380 .Bad_Message
 3390 EQUD &00123458
 3400 EQUS "Unknown opcode fo
r SWI "+PS$+"Buffer_Control"+
CHR$0
 3410 ALIGN
 3420 .Return_Buffer_Info
 3430 STMFD R13!,{R2-R9}
 3440 MOV R9,R1
 3450 ADR R1,areweon
```

```
3460 LDR R0,[R1]:STR R0,[R9]
3470 LDR R0,[R12]
3480 LDR R1,[R12,#4]
3490 SUB R1,R1,R0
3500 SUB R1,R1,#1
3510 STR R1,[R9,#4]
3520 LDR R2,[R12,#8]
3530 LDR R1,[R12,#12]
3540 LDR R3,[R9,#4]
3550 SUB R1,R2,R1:CMP R1,#0
3560 ADDLT R1,R1,R3
3570 STR R1,[R9,#8]
3580 LDMFD R13!,{R2-R9,PC}
3590 .Adjust_Buffer_State
3600 STMFD R13!,{R2-R9}
3610 CMP R1,#0
3620 BEQ Setdown_Swi
3630 BL setup:ADR R2,areweon
3640 LDR R1,[R2]
3650 LDMFD R13!,{R2-R9,PC}
3660 .Setdown_Swi:MOV R2,#0
3670 MOV R1,#0:MOV R0,#0
3680 BL setdown
3690 ADRVC R2,areweon
3700 LDRVC R1,[R2]
3710 LDMFD R13!,{R2-R9,PC}
3720 .Set Buffer Size
3730 ADR R2,areweon
3740 LDR R2,[R2]:CMP R2,#0
3750 BNE changewhileon
3760 MOVS R1,R1
3770 BMI minusparm
3780 MOV R2,R1:MOV R0,#10
3790 ADD R2,R2,#17
3800 LDR R10,[R12,#4]
3810 MOV R9,R2:SUB R3,R2,R10
3820 MOV R2,R12:MOV R0,#13
3830 SWI "XOS_Module"
3840 LDMVSFD R13!,{PC}
3850 CMP R0,#13:BNE error
3860 STR R2,[R11]:MOV R3,R9
3870 STR R3,[R2,#4]
3880 MOV R3,#&10:STR R3,[R2]
3890 STR R3,[R2,#8]
3900 STR R3,[R2,#12]
3910 LDMFD R13!,{PC}
3920 .Flush_Buffer
3930 STMFD R13!,{R2-R9}
3940 LDR R0,[R12]
3950 STR R0,[R12,#8]
3960 STR R0,[R12,#12]
3970 LDMFD R13!,{R2-R9,PC}
3980 .BadSWINumber
3990 ADR R0,BadSWIMessage
 4000 LDMFD R13!,{R14}
 4010 ORRS PC,R14,#1<<28
 4020 .BadSWIMessage
 4030 EQUD &00123459
 4040 EQUS "Buffer Module doe
sn't recognise this SWI numbe
r"+CHR$0
 4050 ALIGN
 4060 .minusparm
 4070 ADR R0,minusmessage
 4080 LDMFD R13!,{R14}
 4090 ORRS PC,R14,#1<<28
 4100 .minusmessage
 4110 EQUD &0012345A
 4120 EQUS "Warning.. Garbage
 in size parameter."+CHR$(0)
 4130 ALIGN
 4140 .error
 4150 LDMFD R13!,{R14}
 4160 ORRS PC,R14,#1<<28
 4170 .dsize:EQUD dsize%
 4180 ]:NEXT
 4190 SYS "OS_File",10,ps$+"B
ufMod",&FFA,,Q%,Q%+P%
 4200 END
```

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Beebug Public Domain Software

As a new service to RISC User members, BEEBUG will be distributing public domain software.
This month we are launching 12 discs from our public domain library which will be updated with new titles in the future.
We are also offering a **Sampler** disc with a selection of public domain programs from all spheres of interest.
Unlike other Public Domain software, our discs contain as near as possible to 800k (and not less than 700k).
Each disc includes a 'Read Me' file, and there are some instructions with the programs.

The Public Domain discs are available only to RISC User members for £2.99 (postage is 60p for the first disc and 30p for each additional disc). The discs are offered as seen, and we cannot enter into any discussion regarding their contents.

To order phone **(0727) 40303**, Fax (0727) 860263, or write to:
BEEBUG, 117 Hatfield Rd, St. Albans, Herts AL1 4JS.

PD12 Disc

Contains 5 sound and graphics demos from Hugo Fiennes of the Serial Port. All five are stunning examples demonstrating the Arc's capabilities.

PD13 Disc

Contains the !Projector application that displays films created with the Ace Computing Mogul package. Six example films are included.

PD14 Disc

Contains REG, a suite of programs for recording student achievement levels in schools. Also included is a way of recording attainment with Colton Software's Pipedream.

PD15 Disc

Contains Arctist+ and BigM, both 256 colour art packages, along with Design, a symmetrical pattern designer.

PD17 Disc

Contains a collection of 27 amusing trick and novelty programs. Some of them produce the weirdest effects!

PD19 Disc

Contains 10 games programs, Adventure, Battle, Battleships, Connect4, Darts, Fish (Pelmanism), Fruit Machine, Golf, Hangman and Impact.

PD20 Disc

Contains 12 games programs, Invaders, Line Of Five, Reversi, Pelmanism, Rocks, Rubik Cube, Simon, Solitaire, Star Trek, Tetris, Tile Trial and Dice game.

PD22 Disc

Contains three stunning sound & graphics demos, Noah, Chips and Demo01.

PD25 Disc

Contains four sound & graphics demos, Deskballs, DudsDemo, EgIntro, and Z-Brother.

PD28 Disc

Contains 20 utilities of various types. These are all extremely good and there is something here no doubt to please everyone. Space does not permit full descriptions but the files are: 1stFile, ASm2, CloseUp, Crypt, Dir, Display, Drawlink, Dustbin, Filetypes, FileUtils, Find, Keys, Loadprogs, MultiPrint, NewBar, NewCodes, PD_Impress, PrinterTx, ProgCalc, and Set_Type.

PD29 Disc

Contains over 4 megabytes of Sprite clip-art to load into DTP or use in your programs. The files are naturally in a compressed form and the disc contains the program complete with instructions to uncompress them.

PD30 Disc

Contains over 2 megabytes of Sprite clip-art and Draw files to load into DTP or use in your programs. The files are naturally in a compressed form and the disc contains the program with instructions to uncompress them.

Public Domain Sampler Disc (PDS1)

This disc contains sample programs from the Beebug Public Domain Software Library. The programs are as follows:

STracker - The STracker application is used to play back a music file ***Toccata*** made of real sampled sounds which are sequenced to form a complete tune lasting several minutes. The quality of this is quite stunning, particularly if played through the computer's monitor speaker, or a hi-fi system.

Accounts - This is a home accounts program. There are no instructions included with the program but all functions are selected from the main menu which is self explanatory. An example file is included.

DiscLabel - This is a versatile disc labelling program producing professional looking labels for 3.5" discs. A Help file is included with the program.

Follow - This is a novelty program that when run puts a pair of beady eyes on the desktop that follow the mouse pointer wherever it goes. Eerie!

Hangman - A well presented and implemented version of the old word game of Hangman with an animated finale.

Multiprint - A utility to allow the printing of files by creating a task list of the files to print before sending them to the printer. A Help file is included within the program.

Rotate - A fascinating animated demo in which you can alter the effects by pressing a few keys on the keyboard.

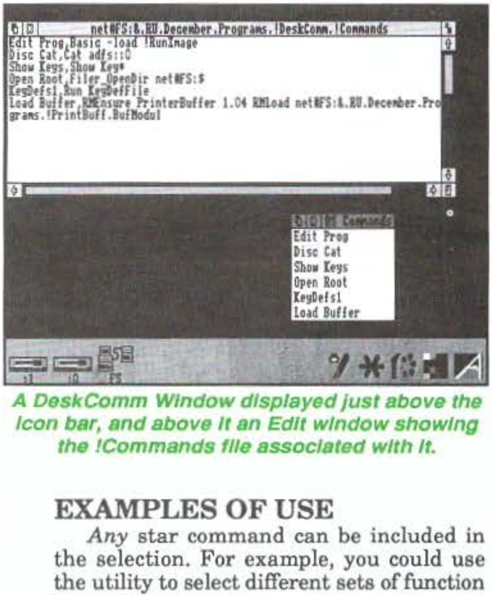
STD - A useful utility to search for telephone STD codes or find a town from its STD code. A ReadMe file is included in the program.

Wanda - A novelty demo program that infests your desktop screen with a shoal of bubble-blowing goldfish!

Desktop Command Controller

Run your favourite operating system commands from the Desktop with this utility by Glynn Clements.

The Desktop Command Controller presented here is a multi-tasking utility which is installed on the icon bar. It allows you to open a window which can contain a selection of user-definable names, each of which has an associated OS command. Clicking on any name in the window will execute the command, just as if it had been typed in at the command line.



```
Edit Prog,Basic -load !RunImage
Disc Cat,Cat adfs::0
Show Keys,Show Key*
Open Root,Filer_OpenDir net#FS:$
KeyDefs1,Run KeyDefFile
Load Buffer,RMEnsure PrinterBuffer 1.04 RMLoad net#FS:&.RU.December.Pro
grams.!PrintBuff.BufModul
```

A DeskComm Window displayed just above the icon bar, and above it an Edit window showing the !Commands file associated with it.

EXAMPLES OF USE

Any star command can be included in the selection. For example, you could use the utility to select different sets of function key definitions, to open frequently used directory windows with the *Filer_OpenDir* command, to install modules and applications, or to supply lengthy commands which you use regularly, for example when using a C compiler.

CREATING THE APPLICATION

As usual with Desktop applications, you must first create an application directory, called *!DeskComm*. Then create an Obey file using Edit, with the following three lines:

```
Set DeskComm$Dir <Obey$Dir>
WimpSlot -min 16K -max 16K
Run <DeskComm$Dir>.!RunImage
```

Save this in the application directory as *!Run*. You may also like to create a sprite file in the usual way. The whole procedure of creating an application framework has been covered many times in RISC User, but the simplest way to do it is to use the Application Shell Generator from RISC User Volume 3 Issue 2 (or the multi-tasking version on the Volume 3 Special Disc).

Having done this, type in the listing given here and save it in the application directory with the name *!RunImage*. When you are satisfied that your typing is correct and the program works properly, you should remove line 80.

Before you can run the application, you need a further file which will contain the commands which appear in the window. This should be a plain text file, again created using Edit, and must be filed in the application directory as *!Commands*. Each line of the file must contain the text which is to appear in the window (*maximum 11 characters*), followed by a comma, followed by the command which is to be executed when the option is selected in the window. Only one command can be processed per line, but it is possible to execute multiple commands by including them in an Obey file and using DeskComm to run it (see the key definitions example below). The following example would display two options in the window, *Edit Prog* and *Disc Cat*:

```
Edit Prog,Basic -load !RunImage
Disc Cat,Cat adfs::0
```

Clicking on *Edit Prog* would execute the command:

```
*Basic -load !RunImage
```

while clicking on *Disc Cat* would catalogue the disc in drive 0.

The program holds these commands in an array, *comms$*. This is currently set to hold a maximum of 30 commands, but by altering the DIM statement at line 430 this can be increased. Simply change the line to:

```
430 DIM comms$(1,x)
```

where x is the total number of commands minus one.

USING THE PROGRAM

Using this utility provides a very fast way of issuing regularly used commands. Some examples of its application were given earlier, such as selecting key definitions, opening directory viewers and installing modules. The following !Commands file shows how these might be implemented:

```
KeyDefs1,Obey KeyDefFile
Open DTP,Filer_OpenDir adfs::HardDisc.$.Apps.DTP
Load Module,RMEnsure MyModule 1.12 RMLoad MyModule
```

Note the use of an Obey file, *KeyDefFile*, in the first line. This may contain several key definitions, all of which are then executed when the Obey file is run by DeskComm, as explained earlier.

```
   10 REM             >!RunImage
   20 REM Program     Command Controller
   30 REM Author      Glynn Clements
   40 REM Version     A1.00
   50 REM RISC User December 1990
   60 REM Program     Subject to copyright
   70 :
   80 ON ERROR MODE12:REPORT:PRINT" at line "ERL:END
   90 PROCfile:DIM b% 256,mb% 52
  100 SYS "Wimp_Initialise",200,&4B534154,"OS Commands"
  110 PROCmenus:PROCicon:PROCwindow
  120 quit%=FALSE
  130 REPEAT
  140 SYS "Wimp_Poll",1,b% TO reason%
  150 CASE reason% OF
  160 WHEN 2: SYS "Wimp_OpenWindow",,b%
  170 WHEN 3: SYS "Wimp_CloseWindow",,b%
  180 WHEN 6: PROCbuttons
  190 WHEN 9: quit%=TRUE
  200 WHEN 17,18: IF b%!16=0 quit%=TRUE
  210 ENDCASE
  220 UNTIL quit%
  230 SYS "Wimp_CloseDown"
  240 END
  250 :
  260 DEF PROCbuttons
  270 LOCAL comm$,p%
  280 CASE b%!12 OF
  290 WHEN -2
  300 IF b%!8 AND 2 THEN
  310 SYS "Wimp_CreateMenu",,mb%,b%!0-64,140
  320 ELSE
  330 !b%=wh%
  340 SYS "Wimp_GetWindowState",,b%
  350 b%!28=-1:SYS "Wimp_OpenWindow",,b%
  360 ENDIF
  370 WHEN wh%: SYS "Wimp_StartTask",comms$(1,b%!16)
  380 ENDCASE
  390 ENDPROC
  400 :
  410 DEF PROCfile
  420 LOCAL fhan%,comm$,comma%
  430 DIM comms$(1,29)
  440 fhan%=OPENIN("<DeskComm$Dir>.!Commands")
  450 comms%=0
  460 WHILE NOT(EOF#fhan% OR comms%>29)
  470 comm$=GET$#fhan%
  480 comma%=INSTR(comm$,",")
  490 IF comma%>1 comms$(0,comms%)=LEFT$(comm$,comma%-1):comms$(1,comms%)=MID$(comm$,comma%+1):comms%+=1
  500 ENDWHILE:CLOSE #fhan%
  510 ENDPROC
  520 :
  530 DEF PROCmenus
  540 $mb%="OS Commands":mb%!12=&70207
  550 mb%!16=160:mb%!20=44:mb%!24=0
  560 mb%!28=&80:mb%!32=-1
  570 mb%!36=&07000021:$(mb%+40)="Quit"
  580 ENDPROC
  590 :
  600 DEF PROCicon
  610 b%!0=-1:b%!4=0:b%!8=0:b%!12=68
  620 b%!16=68:b%!20=&10003002
  630 $(b%+24)="!DeskComm"
  640 SYS "Wimp_CreateIcon",,b% TO ihan%
  650 ENDPROC
  660 :
  670 DEF PROCwindow
  680 b%!0=800:b%!4=100:b%!8=1072
  690 b%!12=100+40*comms%:b%!16=0
  700 b%!20=0:b%!24=-1:b%!28=&87000012
  710 b%!32=&207:b%!36=&80102:b%!40=0
  720 b%!44=-40*comms%:b%!48=272:b%!52=0
  730 b%!56=&19:b%!60=0:b%!64=0:b%!68=0
  740 $(b%+72)="OS Commands":b%!84=0
  750 SYS "Wimp_CreateWindow",,b% TO wh%
  760 b%!0=wh%
  770 FOR i%=0 TO comms%-1
  780 b%!4=0:b%!8=-40*i%-40:b%!12=272
  790 b%!16=-40*i%:b%!20=&7019031
  800 $(b%+24)=LEFT$(comms$(0,i%),11)
  810 SYS "Wimp_CreateIcon",,b%
  820 NEXT i%
  830 ENDPROC
```

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A Vector Listing Utility

David Spencer presents a short utility to help assembly language programmers.

RISC OS supports a mechanism of vectors to allow various operating system features to be intercepted or extended. The idea is that when certain operating system calls are made by an application (or indeed any other program), rather than jumping straight to the routine to perform the operation, RISC OS instead reads an address from a particular memory location and jumps to that address. This address is called a *vector*, and by default will be the address of the routine in RISC OS to perform the desired operation. For example, all calls to the SWI "OS_WriteC" (and hence all calls to output characters) use a vector called *WrchV*. By default, this vector points to the routine to output the characters. However, the user could write a piece of code to replace the standard output routine, and by making *WrchV* point to this code it would be called each time SWI "OS_WriteC" was issued.

RISC OS goes one stage further, and introduces the concept of *vector chains*. With this technique, each time a vector is changed to point to a new piece of code, rather than discarding its old value, it is inserted at the front of a queue of routines attached to the vector. Whenever an operating system call jumps through a vector, the most recent claimant is called first. The code can do whatever processing it requires, and then either claim the call to stop any other code attached to the vector from getting it, or it can pass on the call to the next most recent claimant. This happens down the chain until the call is either claimed, or all the routines attached to the vector have been called. For example, you could add a routine to *WrchV* to convert all letters to lower case. This routine would then pass on the call to allow the standard character output routine to do its job.

There are a total of forty-eight vectors in RISC OS, each being used for a different operating system function. For full details of how to use vectors refer to the appropriate chapter in the *Programmer's Reference Manual* (pages 55 to 84).

A VECTOR LISTER

The purpose of the program given here is to list for each vector all the routines attached to it. For each vector, its vector number and name are displayed, and for each routine, the address and workspace pointer are given. The workspace pointer is a value that is registered alongside the routine and is loaded into register R12 whenever the routine is called.

Having typed in and saved the program, simply run it. The chain for each vector is printed out in turn, with the routine at the top of the chain first (in other words the routine that will be called first). All numbers are in hex, and each entry is in the form *routine address, workspace pointer*.

```
   10 REM              >VectorList
   20 REM Program     Vector Lister
   30 REM Version     A 1.0
   40 REM Author      David Spencer
   50 REM RISC User December 1990
   60 REM Program     Subject to Copyright
   70 :
   80 list=&8C8
   90 PRINT'TAB(34)"VECTOR LIST"'
  100 FOR F%=0 TO &2F
  110 READ vector$
  120 PRINT RIGHT$("0"+STR$~F%,2);" ";ve
ctor$;TAB(22);
  130 ptr=list!(F%*4)
  140 WHILE ptr
  150 PRINT RIGHT$("0000000"+STR$~ptr!8,
8);",";RIGHT$("0000000"+STR$~ptr!4,8);"    ";
  160 ptr=!ptr
  170 ENDWHILE
  180 PRINT
  190 NEXT
  200 PRINT
  210 :
  220 DATA UserV,ErrorV,IrqV,WrchV,ReadC
V,CLIV,Byt
eV,WordV,FileV,ArgsV,BgetV
  230 DATA BputV,GBPBV,FindV,ReadLineV,F
SControlV,EventV,UptV,NetV,KeyV
  240 DATA InsV,RemV,CnpV,UKVDU23V,UKSWI
V,UKPLOTV,MouseV,VDUXV,TickerV
  250 DATA UpcallV,ChangeEnvironmentV,Sp
riteV,Draw
V,EconetV,ColourV,PaletteV
  260 DATA SpareVecC,SpareVecB,SpareVecA
,SpareVec9
,SpareVec8,SpareVec7
  270 DATA SpareVec6,SpareVec5,SpareVec4
,SpareVec3,SpareVec2,SpareVec1
```

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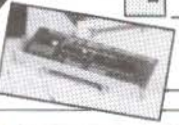

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Three Dimensional Fractals

by John Greening

Like many many other computer users I have been fascinated by fractals ever since becoming acquainted with the Mandelbrot Set. My interest led me to read some of the books written by Benoit Mandelbrot, the man who first coined the word "fractal", and in one of them a particular illustration caught my eye. It showed a rectangular block absolutely riddled with rectangular holes. At that time I wondered how it had been produced, but I later realised that the hidden surface removal could be achieved by gradually building the block from the back and bottom, forward and up. This is implemented as the program 3DFractal listed here.

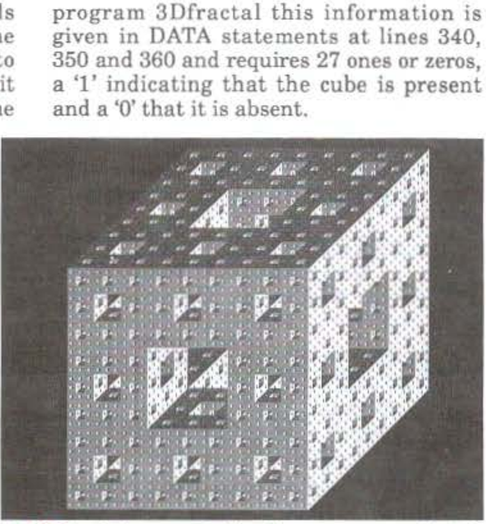
USING THE PROGRAM

Type in the program 3DFractal and save a copy before running it. When run, the program creates a sprite which is used to draw a so-called Menger sponge. This is to three dimensional fractals what a Sierpinski sieve is to two.

3D FRACTALS

The x axis of the fractal runs from left to right, the y axis from bottom to top, and the z axis comes out of the screen. The fractal is built up by repeated plotting of a small sprite. Starting from minimum x, y, and z, the sprite is moved from left to right to form a row, then more rows are added to form a plane, and more planes are generated to complete a cube. However, it would be boring if the sprite was plotted at every position, as all one would get would be a solid block. It is here that the basic design of the fractal must be laid down.

The basic fractals (the *initiators* in 'fractal speak') will be cubes with 'bits' missing. The first thing to decide is the number of elements along each side of the basic cube, e.g. 2x2x2, 3x3x3, etc. Suppose you decide on 3x3x3. Then there will be 27 small cubes making up the basic fractal. The next element in the design is to decide which of those 27 cubes are to be present and which are to be absent. In the program 3Dfractal this information is given in DATA statements at lines 340, 350 and 360 and requires 27 ones or zeros, a '1' indicating that the cube is present and a '0' that it is absent.



A 3D fractal generated by the program as listed

The program reads these DATA statements in such a way that the first item read relates to the left-hand element in the back row of the bottom layer of little cubes, the next to the middle element in the same row and layer, and the next to the right-hand element in that row and layer. The next three items of data give the corresponding information for the three cubes in the middle row of the bottom layer and the next three to the three cubes in the front row of the bottom layer. The next 9 items relate to the corresponding elements in the middle layer, and the final 9 items are similarly related to the top layer of cubes.

The program requires three further items of data which are entered at line 330. The first is simply the number of little cubes, *n%*, along one side of the basic fractal (equal to 3 in the example). The second, *power%*, determines the overall size of the final fractal. In the interest of plotting speed the assembler program uses shifts and increments and avoids multiplications and divisions. As a result the final fractal size can only go up by powers of the number, *n%*. You need to specify this power as the second item (4 in the example).

The third item, *depth%*, is, in effect, the depth of recursion of the program. The value of this depth cannot meaningfully be greater than the value of *power%*. In the example it is set equal to the power (with a value of 4), giving the finest detail (with a depth of 1 a large version of the basic fractal would have been plotted).

ALTERNATIVE FRACTALS

Alternative DATA statements for three other fractals are shown below for you to try.

```
330DATA 2,6,6
340DATA 1,1, 1,1
350DATA 1,1, 0,0

330DATA 3,4,4
340DATA 1,1,1, 1,0,1, 1,1,1
350DATA 0,1,0, 0,1,0, 0,1,0
360DATA 1,1,1, 1,0,1, 1,1,1

330DATA 4,3,3
340DATA 1,1,1,1, 1,1,1,1, 1,1,1,1, 1,1,1,1
350DATA 1,1,1,1, 1,1,1,1, 1,1,1,0, 1,1,0,1
360DATA 1,1,1,1, 1,1,1,0, 1,1,1, 1, 1,0,1,1
370DATA 1,1,1,1, 1,0,1,1, 1,1,0,1, 1,1,1,1
```

DESIGNING YOUR OWN 3D FRACTALS

Once you have experimented with the four fractals given above, it is time to try your hand at designing your own. To be frank, there is not too much to be done with a cube 2x2x2 as there are only eight cubes to work with. 5x5x5 is a little disappointing as putting *power%*=2 gives a rather small fractal, and putting *power%*=3 makes some of the fractal go off the screen. I would recommend that you start off using *n%*=3 or 4. Do not put in too many holes or the three-dimensional effect tends to get lost. It can be advantageous to try out a possible fractal using a low value of *power%* (and also of *depth%*) as a small fractal is plotted in a few seconds and will give you a good idea of what you will get in a larger one.

PROGRAM NOTES

The program consists essentially of three nested loops for the y, z, and x co-ordinates that can be taken up by the sprite. The more difficult part is handling the data that determine whether or not the sprite should be plotted when at these co-ordinates. This requires that a count is maintained of y, z, and x to base n%. The subroutine *nupdate* does this and the other subroutine, *zero*, zeroes the bytes in the base *n%* counters whenever y, z, or x are zero.

At the appropriate point in the x loop (namely at *cubeloop*) the sprite plotting decision is made. Suppose that the value of *power%* is 4. The code looks at the 4th byte in the base *n%* counters (the *n%* 'thousands') at *yinn*, *zinn*, and *xinn*, multiplies the first of these by n%^2, the second by *n%*, adds them together and then adds in the third giving a result *p*, say. It then looks at the *p*th byte of the *n%^3* bytes assembled at the end of the code at *cube* to see whether it is a 1 or a 0. If it is a 0 the sprite is inside a large hole, and the program moves on to the next position of the sprite. If the byte is a 1, and depending on the value of *depth%*, the code examines the 3rd bytes in the base *n%* counters (the *n%* 'hundreds') in the same way to see if the sprite is in a smaller hole. If *depth%* is equal to *power%* this process will continue down to the first bytes in the base *n%* counters, but will otherwise break off earlier.

If at the lowest level considered the byte looked at in *cube* is still a 1 the sprite will be plotted. In order to give a three-dimensional representation on a two-dimensional screen the sprite is plotted at (2*x-z)*4, (2*y-z)*4.

```
10 REM            >!RunImage
20 REM Program    3D Fractals
30 REM Version    1.0
40 REM Author     John Greening
50 REM RISC User December 1990
60 REM Program    Subject to copyright
```

```
   70 :
   80 MODE1
   90 DIM code% 600,sprite% 72
  100 sprite%!0=72:sprite%!4=0
  110 sprite%!8=16:sprite%!12=16
  120 GCOL 0,1:LINE 0,8,8,8
  130 GCOL 0,2:RECTANGLE FILL 0,0,4,4
  140 GCOL 0,3:LINE 8,0,8,4
  150 MOVE 0,0:MOVE 8,8
  160 SYS "OS_SpriteOp",256+14,sprite%,"
scube",0
  170 READ n%,power%,depth%
  180 IF depth%>power% ERROR 1,"Look at
first line of DATA. depth% must be <= po
wer%"
  190 PROCassemble
  200 VDU19,3,6,0,0,0,19,2,4,0,0,0
  210 ORIGIN 640-(n%^power%)*2,512-(n%^p
ower%)*2
  220 FOR Q%=0 TO (n%-1)*n%^2 STEP n%^2
  230 FOR R%=0 TO (n%-1)*n% STEP n%
  240 FOR S%=0 TO n%-1
  250  READ cubedata%
  260  cube?(Q%+R%+S%)=cubedata%
  270 NEXT,,
  280 CLS
  290 CALL code%
  300 Q%=GET
  310 END
  320 :
  330 DATA 3,4,4
  340 DATA 1,1,1, 1,0,1, 1,1,1
  350 DATA 1,0,1, 0,0,0, 1,0,1
  360 DATA 1,1,1, 1,0,1, 1,1,1
  370 :
  380 DEF PROCassemble
  390 REM R0, R1, and R2 are general and
 needed for O.S. calls.
  400 REM R3=x:R4=y:R5=z
  410 REM R6=index for base references
  420 REM R7=base for cube(and for x-,y-
,and zinn in subroutine zero)
  430 REM R8 is base for xinn
  440 REM R9 is base for yinn
  450 REM R10 is base for zinn
  460 REM R11 is a counter.
  470 FOR pass%=0 TO 2 STEP 2
  480 P%=code%
  490 [OPT pass%
  500 MOV R12,R14:ADR R7,yinn:BL zero
  510 ADR R8,xinn:ADR R9,yinn
  520 ADR R10,zinn:MVN R0,#0
  530 STRB R0,[R9]:MVN R4,#0
  540 .yloop
  550 ADD R4,R4,#1:LDRB R0,[R9]
  560 ADD R0,R0,#1:STRB R0,[R9]
  570 ADR R7,yinn:BL nupdate
  580 SWI "OS_ReadEscapeState"
  590 BCS escape
  600 ADR R7,zinn:BL zero
  610 MVN R0,#0:STRB R0,[R10]:MVN R5,#0
  620 .zloop
  630 ADD R5,R5,#1:LDRB R0,[R10]
  640 ADD R0,R0,#1:STRB R0,[R10]
  650 ADR R7,zinn:BL nupdate
  660 ADR R7,xinn:BL zero
  670 MVN R0,#0:STRB R0,[R8]
  680 MVN R3,#0
  690 .xloop
  700 ADD R3,R3,#1:LDRB R0,[R8]
  710 ADD R0,R0,#1:STRB R0,[R8]
  720 ADR R7,xinn:BL nupdate
  730 ADR R7,cube:MOV R6,#power%
  740 .cubeloop
  750 MOV R11,#(n%^2+1):SUB R6,R6,#1
  760 LDRB R2,[R9,R6]:MOV R0,#0
  770 .cloop1
  780 SUB R11,R11,#1:ADD R0,R0,R2
  790 CMP R11,#1:BNE cloop1
  800 MOV R11,#(n%+1)
  810 LDRB R2,[R10,R6]:MOV R1,#0
  820 .cloop2
  830 SUB R11,R11,#1:ADD R1,R1,R2
  840 CMP R11,#1:BNE cloop2
  850 ADD R0,R0,R1:LDRB R2,[R8,R6]
  860 ADD R0,R0,R2:LDRB R1,[R7,R0]
  870 CMP R1,#0:BEQ nextx
  880 CMP R6,#(power%-depth%)
  890 BNE cubeloop
  900 STMFD R13!,{R3-R5}
  910 MOV R0,#256:ADD R0,R0,#34
  920 LDR R1,spritearea
  930 ADR R2,spritename
  940 MOV R3,R3,ASL#3:SUB R3,R3,R5,ASL#2
  950 MOV R4,R4,ASL#3:SUB R4,R4,R5,ASL#2
  960 MOV R5,#0
  970 SWI "OS_SpriteOp"
  980 LDMFD R13!,{R3-R5}
  990 .nextx
 1000 CMP R3,#(n%^power%-1):BNE xloop
 1010 CMP R5,#(n%^power%-1):BNE zloop
 1020 CMP R4,#(n%^power%-1):BNE yloop
 1030 MOV PC,R12
 1040 :
 1050 .spritearea
 1060 EQUD sprite%
1070 .spritename
1080 EQUS "scube"+CHR$(0)
1090 ALIGN
1100 :
1110 .nupdate
1120 MVN R6,#0
1130 .nloop
1140 ADD R6,R6,#1:LDRB R0,[R7,R6]
1150 .nloop2
1160 CMP R0,#n%:BNE overl
1170 MOV R0,#0:STRB R0,[R7,R6]
1180 ADD R6,R6,#1:LDRB R0,[R7,R6]
1190 ADD R0,R0,#1:STRB R0,[R7,R6]
1200 B nloop2
1210 .overl
1220 CMP R6,#(power%-1):BNE nloop
1230 MOV PC,R14
1240 :
1250 .zero
1260 MOV R6,#0:MOV R0,#0
1270 .zeroloop
1280 ADD R6,R6,#1:STRB R0,[R7,R6]
1290 CMP R6,#power%:BNE zeroloop
1300 MOV PC,R14
1310 :
1320 .escape
1330 ADR R0,escape_err
1340 SWI "OS_GenerateError"
1350 :
1360 .escape_err
1370 EQUD 17
1380 EQUS "Escape"+CHR$(0)
1390 ALIGN
1400 :
1410 .xinn
1420 FNreserve(power%+1)
1430 ALIGN
1440 .yinn
1450 FNreserve(power%+1)
1460 ALIGN
1470 .zinn
1480 FNreserve(power%+1)
1490 ALIGN
1500 .cube
1510 FNreserve(n%^3)
1520 ]
1530 NEXT
1540 ENDPROC
1550 :
1560 DEF FNreserve(noofbytes)
1570 P%=P%+noofbytes
1580 =pass%
```

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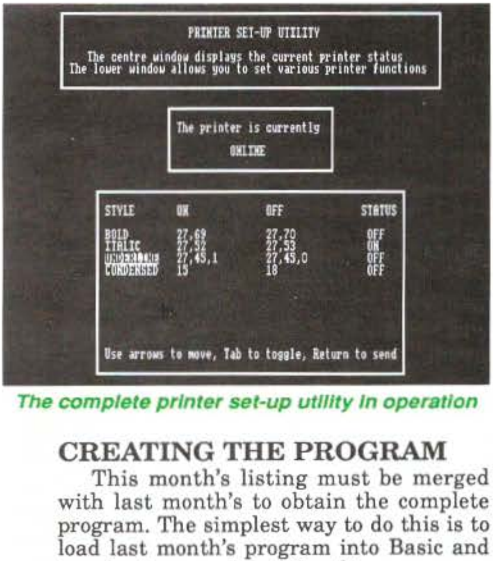
A Printer Set-Up Utility (Part 2)

Alan Wrigley continues his description of this simple non-Wimp program, which is ideal for readers with little or no experience of typing in programs.

As promised in Part 1 last month, this month's listing adds the facility to select or deselect certain printer functions, and send the codes to the printer as part of the set-up procedure.

The listing given here allows you to choose bold, italic, underline and condensed. However, it has been written in such a way that it is very easy for you to alter these to suit your own requirements, or indeed to add further printer styles if you wish. I will describe how to do this later.



```
                PRINTER SET-UP UTILITY

   The centre window displays the current printer status
The lower window allows you to set various printer functions


                The printer is currently
                         ONLINE


STYLE       ON          OFF          STATUS

BOLD        27,69       27,70        OFF
ITALIC      27,52       27,53        ON
UNDERLINE   27,45,1     27,45,0      OFF
CONDENSED   15          18           OFF


Use arrows to move, Tab to toggle, Return to send
```

The complete printer set-up utility in operation

CREATING THE PROGRAM

This month's listing must be merged with last month's to obtain the complete program. The simplest way to do this is to load last month's program into Basic and type in the new lines. For this reason you must make sure the line numbers are exactly as given here. Note that line 390 replaces the existing line with that number. When you have finished, save the complete program as *PrintSet*.

USING PRINTSET

When you run the program, you will now see the four printer styles in the bottom window, together with the printer codes for each, and the current status, which initially will be OFF. The first style, Bold, will be highlighted; pressing Tab will change the status of Bold to ON, and pressing it again will turn it back to OFF. You can cycle through the styles with the up and down cursor keys, and toggle the status with Tab as described. When you are satisfied that you have chosen the combination of styles you want, press Return and the codes will be sent to the printer (providing it is on line). As well as the codes to switch on any selected functions, codes are sent to switch *off* any functions whose status is OFF. This ensures that there are no unwanted codes left active from a previous print job.

ADDING YOUR OWN FUNCTIONS

It is very simple to alter the printer functions defined in the program, or to add your own. All you need to do is to add further DATA statements at the end of the program. Each function must have three strings in the DATA statement. These are respectively the name of the function, the decimal codes to switch it on and the decimal codes to switch it off. For example, ESC "E" (turn on Bold on an Epson compatible) becomes 27,69 (27 being the ASCII code for Escape and 69 for "E"). Note that each string of codes *must* be enclosed within quotes in the DATA statement, as otherwise the commas between the codes will be taken as data separators and not part of the string. Having done this, you merely need to alter line 110 to st%=x, where x is the number of functions defined in the DATA statements minus one. There should be room in the window for about eight functions altogether.

```
   10 REM            >PrintSet2
   20 REM            Printer Set-Up
   30 REM Version    A1.00
   40 REM Author     Alan Wrigley
   50 REM RISC User December 1990
   60 REM Program    Subject to copyright
   70 :
   90 VDU23,16,0,254,0,0,0,0,0,0:*FX4,1
  110 st%=3:REM one less than number of
styles
  120 DIM style$(st%),stat%(st%)
  130 DIM on$(st%),off$(st%)
  160 FOR i%=0 TO st%
  170 READ style$(i%),on$(i%),off$(i%)
  180 NEXT:n%=0
  390 FOR i%=0 TO st%
  400 IF n%=i% THEN COLOUR 0:COLOUR 134
ELSE COLOUR 6
  410 PRINTstyle$(i%);:COLOUR 7:COLOUR 1
28
  420 PRINT TAB(12)on$(i%)TAB(27)off$(i%
)TAB(44);
  430 COLOUR 1+stat%(i%):IF stat%(i%) TH
EN PRINT"ON " ELSE PRINT"OFF"
  440 COLOUR 7:NEXT
  450 PRINT TAB(0,12)"Use arrows to move
, Tab to toggle, Return to send";
  630 key%=INKEY(1)
  640 VDU 28,16,30,64,17
  650 CASE key% OF
  655 WHEN -1
  660 WHEN 9:stat%(n%)=stat%(n%) EOR 1
  670 PRINT TAB(44,n%+2);:COLOUR 1+stat%
 (n%)
  680 IF stat%(n%) THEN PRINT"ON " ELSE
PRINT"OFF"
  690 COLOUR 7
  700 WHEN 138,139:old%=n%
  710 n%=n%+(key%=139)-(key%=138)
  720 IF n%=-1 n%=st%
  730 IF n%>st% n%=0
  740 COLOUR 6:PRINT TAB(0,old%+2)style$
(old%)
  750 COLOUR 0:COLOUR 134
  760 PRINT TAB(0,n%+2)style$(n%)
  770 COLOUR 128:COLOUR 7
  780 WHEN 13:PROCsend
  790 ENDCASE
  820 DEF PROCsend
  830 VDU 2,1,27,1,64:FOR i%=0 TO st%
  840 IF stat%(i%) THEN code$=on$(i%) EL
SE code$=off$(i%)
  850 REPEAT
  860 a%=INSTR(code$,",")
  870 VDU 1,VAL(LEFT$(code$,a%-1))
  880 code$=RIGHT$(code$,LENcode$-a%)
  890 UNTIL a%=0
  900 NEXT
  905 VDU3
  910 ENDPROC
  920 :
 1050 :
 1060 DATA "BOLD","27,69","27,70"
 1070 DATA "ITALIC","27,52","27,53"
 1080 DATA "UNDERLINE","27,45,1","27,45,
0"
 1090 DATA "CONDENSED","15","18"
```

RU

!ArcScan

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RISC OS Programmer's Reference Manual

ARCSCAN II
RISC User word search
RISC User data requested
Volumes 1 to 2 present
Total size of data 56K
Data now loaded
Database ends at Volume 2 number 9
RISC User
Vols 1 - 2
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Enter search strings at the
breaking off at any ti
required option

ArcScan
Fe

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options

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A user-defined c
allows ea
for

For example:

words 'obey', 'files' and click on the AND
played. You can now call up the Acorn Manuals
er references.
&400D4, select the new Programmers Reference Manual
&400D4", and the answer appears, complete with page references.

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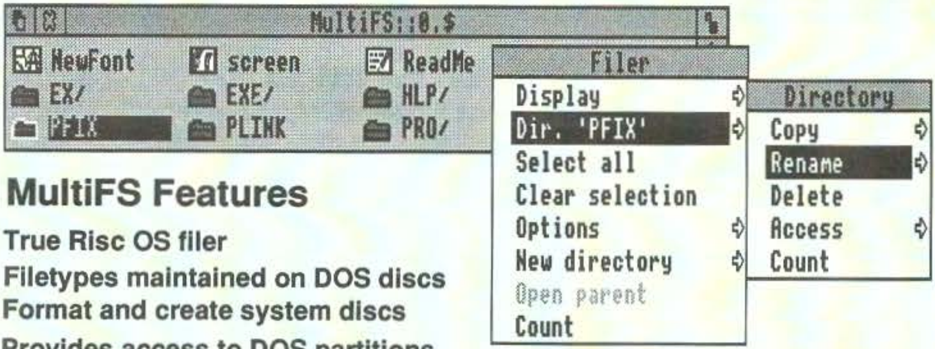

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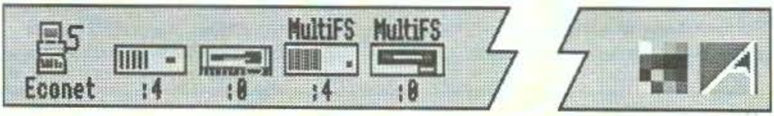
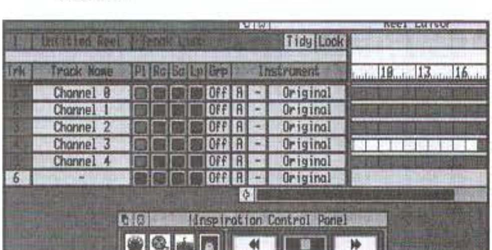


Inspiration - MIDI Sequencer

Reviewed by Ian Waugh

Avid Acorn watchers - musicians especially - have waited over two years for Inspiration - a MIDI sequencer aspiring to professional standards which uses RISC OS and takes advantage of the Archimedes' superior power and performance. It will run on an Archimedes with only 1MByte of memory - including the A3000 - but you are recommended to upgrade to at least 2MBytes of RAM otherwise there will be a trade off between note capacity and reliability - you've been warned!



Trk	Track Name	Pl	Rc	So	Lp	Grp			Instrument
1	Channel 0	■	■	■	■	Off	A	-	Original
2	Channel 1	■	■	■	■	Off	A	-	Original
3	Channel 2	■	■	■	■	Off	A	-	Original
4	Channel 3	■	■	■	■	Off	A	-	Original
5	Channel 4	■	■	■	■	Off	A	-	Original
6	-	■	■	■	■	Off	A	-	Original

-000:04:48:011 POSITION
0001:01:01:001 CUE START
00:00:16:16:04 SMPTE TIME
0005:01:01:001 CUE END

Control Panel, Reel Editor and Track List

You also need a MIDI interface. Inspiration is only guaranteed to run with Acorn's MIDI interface version 3.14 or later and Pandora's own PMI4 MIDI interface. Also, as some of the windows are too large to fit onto the screen in their entirety on a normal monitor (mode 16 gives the best results), a multi-sync monitor is recommended for serious work (although it's not essential), and several alternative modes are supplied on disc for multi-syncs. Of course, you also need some MIDI equipment.

The software is not protected, but a dongle has to be plugged into the parallel port. A 'thru' socket means you can still use your printer. The program is easily installed and run from a hard disc, but although it can be installed on a network such as Econet, it won't run directly with it.

The structural layout goes something like this: there are up to 10 *Reels* each containing up to 256 tracks, each of which can contain up to 10,000 bars. Each track can be assigned a MIDI channel and if you have four individually addressable MIDI Outs (as on the PMI4) you can also specify one of four output buses giving a theoretical output of 64 separate MIDI channels/music lines. In practice, I reckon most users will rarely use more than one Reel. 256 tracks may seem like overkill but lots of tracks are very useful as they let you experiment with alternative music lines.

Before delving into the program's features, it's as well to point out that there are a lot of them, so much so that in a review of this nature it is impossible to cover them all in depth. I'll therefore concentrate on the more unusual and powerful aspects of the software.

The hub of the operation is the main *Control Panel*. This houses transport controls - Play, Rewind and so on - Cue markers, Metronome and Sync options. From here you call up other windows (some of which call further windows) which can be resized and repositioned anywhere on the screen. On the left of the Reel Editor window is a *Track List* which lists the tracks along with up to 11 columns of information such as Name, Delay, Transpose and Loop. You can decide which columns will be shown so you needn't clutter the screen with unwanted information. From here tracks are selected for recording, playback and soloing.

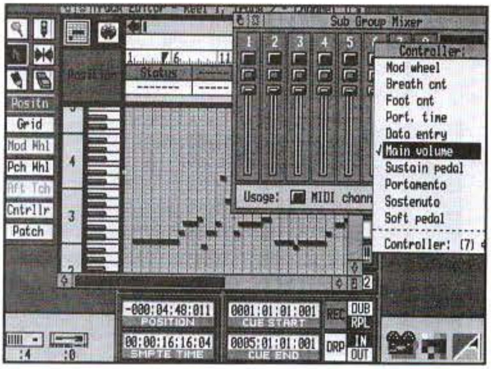
On the right of the Reel Editor is the *Bar Editor* in which the music is displayed in blocks, each representing a bar. You can alter the scale of the display and enter new time signatures. You can perform global edits on the bars including cut, copy, move, delete and insert. Sections of the music are easily selected for editing by rubber-banding. Other options include demixing a track (splitting it onto several other tracks) by note, MIDI channel number or controller type. This is useful if you want to edit just one aspect of a track.

At the top of the Bar Editor is the *Cue Point Field*. Here you can name a point in the song, say the start of a verse or a solo, and tag it with a little flag. These cues are automatically copied to a *Cue List*. Cues can also be set up in individual tracks and these are shown in the Reel Editor in a different colour. The whole Cue system is very well designed.

The *Track Editor* is where you get down to event level editing. It is entered by clicking on the track you want to edit in the Reel Editor. You can work with up to four Track Edit windows at once although you'll be able to see precious little else unless you have a large screen size (in pixels). Notes are shown as long bars on a grid. A keyboard and octave indicator on the left help you work out their pitch. There are many edit functions here including copy, move, cut and paste. Again, notes can be selected by rubber-banding or from a select menu.

You can alter the pitch of notes and their start and end times (and, therefore, their duration) by clicking and dragging. You can specify a *Snap* value for the grid which ensures notes only move in increments of, say, sixteenth or quarter notes. You can draw notes onto the grid which serves as a method of step-time entry. It works quite well although the menu for selecting note durations disappears after each selection. It would have been more useful if it remained on screen.

Below the grid are six windows in which information is displayed graphically. These include Modulation and Pitch Bend Wheel data, Aftertouch and Patch Changes. A Controller window can show the data for any Controller number. Data can be edited and drawn onto the graphs with the mouse. You can, for example, enter modulation data even if your master keyboard doesn't have a Mod Wheel. All data can be shown in text form in a Text Editor window although they can't actually be edited here, which is a pity. High precision controller editing is difficult.



Track Editor with Sub Group Mixer and Controller

The *Toolbox* window houses some of Inspiration's most exciting features - Compress, Change, Invert, Scale, Timestretch and Quantise. These are data conversion functions and require careful setting up. *Compress* evens out widely varying data values and could be used to smooth out velocity. *Invert* can reverse the note order of a section and reflect the notes around a pivot point - this can produce very interesting yet musical results. *Scaling* can create crescendos, diminuendos and even note glissandos. *Timestretch* can stretch or compress a section into a longer or shorter space of time. Change can convert one type of data to another and add or merge the result.

Quantise is probably the most universal and widely-used data manipulation function. It pushes and pulls notes onto specified divisions of the beat to correct sloppy timing. Inspiration's quantise function is very flexible. Not only can you quantise notes which fall within a certain range of the target quantise beat but you can vary the intensity of the quantise and there's a random quantise function, too!

Most of these functions let you stipulate the type of data you wish to affect and the range you wish to encompass. Some can perform quite complex mathematical and logical operations. Change, for example, includes functions such as 'equals', 'not equal', 'greater than', 'less than' and 'between the values of' which can be used to select the target data. Heavy! However, you can grow into these as your experience increases. You can perform several of these operations at once and having created a set of parameters for a favourite operation you can store them in the Toolbox as a Tool. Up to 10 Tools can be stored and saved to disc individually or as a complete Toolkit.

Inspiration saves its files in MIDI file format, which should ensure compatibility with other programs if future music software developers follow suit. It can also load Maestro files, although the save Maestro file facility hasn't yet been implemented in the current version.

One of Inspiration's best features is the *Undo* facility. Given enough memory you can Undo all the way back to the start of a session. *Redo* brings it back. If you're short of memory you can limit the function. You can save the entire history of your recording as a Session file to load into a word processor (Edit will do nicely) - could be heavy reading!

Although these are the major functions, there's still a lot more to Inspiration, but the sheer number of features can hamper the learning process. For example, all three mouse buttons are widely used and in some cases the right button can either increment a value, select an option or call up a menu. It's not always clear what's a label and what's an alterable data value. A little more consistency would be helpful. The manual begins well but it's little more than a list of functions and it contains many forward references. A tutorial section, more diagrams, better examples and an index are all sorely needed.

However, the major criticism of the current version (1.01) is that many errors remain untrapped and, unfortunately, bugs still abound, many of which are fatal and require a complete reboot. Pandora is aware of most of the problems and a version 1.02 is currently being prepared along with a better manual. Bug fixes and minor updates will be free in return for a formatted disc and SAE. A technical helpline is already in operation (see number below).

In its present state, it would be a brave musician indeed who trusted his reputation to Inspiration. If you fall into the home user category, then regular saving will minimise damage in the event of a crash. Despite the apparent high cost, Inspiration, with its many extra features, scores over EMR's Studio24 (and add-ons), and is substantially cheaper than similar software for the Atari ST which costs over £700.

How do you know if it's for you? Well, whether you're a novice or a pro musician, be aware that there will be a learning period. If you like what you've read so far - and Inspiration is potentially a very powerful and versatile program - send a formatted disc (format E) to Pandora along with a suitable SAE and you'll receive a demo copy. This does not support MIDI, however, although it can load files (from Maestro) and you can experiment with the data.

If you can wait until later in 1991, we may see Inspiration Junior which Pandora hopes will sell for around £100. But let's hope the bugs are removed from Father first.

Product	Inspiration
Supplier	Pandora Technology Ltd., Hitcham Lodge, Taplow, Maidenhead, Berkshire SL6 0HG. Tel: 0628 667377 Technical Enquiries 081-977 9164
Price	£299.00 inc. VAT (from BEEBUG)

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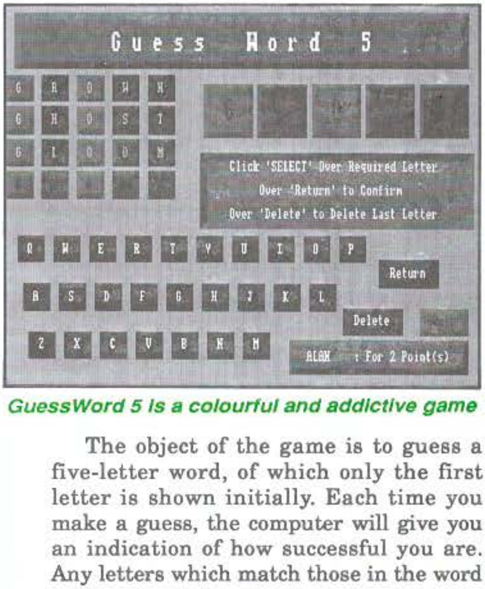
GuessWord 5

As a special treat for Christmas we present a family game for two players by Mike Whiteman.

For reasons of space the program is supplied on this month's magazine disc only.

GuessWord 5 is a variant of the board game *Mastermind*, using five-letter words instead of coloured pegs. The application contains a built-in dictionary of nearly 2900 words; this can be extended by the user, as described later.

GuessWord 5 is colourful, challenging and great fun to play. It will keep all the family amused for hours, and could also be useful in education, for vocabulary and spelling exercises for example.



Click 'SELECT' Over Required Letter

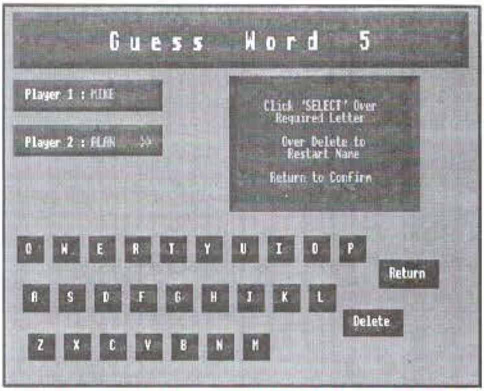
Over 'Return' to Confirm

Over 'Delete' to Delete Last Letter

ALAN : For 2 Point(s)

GuessWord 5 is a colourful and addictive game

The object of the game is to guess a five-letter word, of which only the first letter is shown initially. Each time you make a guess, the computer will give you an indication of how successful you are. Any letters which match those in the word and are in the correct position are highlighted in green, while any which match but are not in the correct position are highlighted in red. You can then use this information to make a further guess, and so on.



Player 1 : MIKE

Player 2 : ALAN >>

Click 'SELECT' Over Required Letter

Over Delete to Restart Name

Return to Confirm

Entering the players' names for GuessWord 5

To play GuessWord 5, double click on the !GWord5 icon in the directory viewer. Once the words have been loaded, you will see a menu screen with four options, *Enter names, Play game, Sound on/off* and *Quit*. You must enter the players' names before you can proceed with the game. This is done by clicking over the letters on a QWERTY keyboard which is shown on the screen. Full instructions on how to play the game are included on the disc.

The dictionary is simply a pure ASCII text file called *Words*, containing five-letter words with no separators. If you load it into Edit, you will see "ABACKABASEABASHABATEABBEY" and so on. To add a word to the dictionary, simply type it into the file between two other words at the correct position in the alphabet. Make sure that you don't start typing in the middle of an existing word! You must then ensure that the space allocated for the dictionary within the program is sufficient. Alter line 1255 to:

```
DIM WordArea n
```

where n is the number of bytes in the file (i.e. 5 times the number of words). RU

Archimedes Software

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Atomwide 8 Megabyte Memory Upgrade

Reviewed by Alan Wrigley

When the Archimedes was first launched in 1987, half a Megabyte of memory, as provided with the A305, seemed staggeringly large to those of us who were accustomed to the 32K of the model B, or even the 128K of the Master. And as if this were not enough, the 1 Mbyte built into the A310 would surely be ample for all possible computing requirements in the future. Well, times change rapidly in the world of computers, and nowadays, with multi-tasking operating systems and applications of a complexity undreamed of a few years ago, 1 Mbyte is woefully inadequate for anything but the most basic of tasks. Had Mr Parkinson formulated his law in the 1980s, it would surely have read "applications expand to fill the amount of memory available".

Given that this rate of progress is likely to continue, today's proud owners of 4 Mbyte machines may soon find themselves in the same position, and so it is a welcome development to see companies such as Atomwide producing memory upgrades which take the Archimedes beyond the 4 Meg barrier. Indeed, when you start getting into the world of Unix, it is more or less *essential* to have at least 8 Mbytes. The Atomwide upgrade reviewed here does in fact provide 8 Mbytes, and can be fitted to all 440s (including 410s and 420s which have already been upgraded to 4 Mbytes), as well as the R140 Unix workstation.

CONSTRUCTION

One of the problems in producing memory upgrades is that the memory controller chip in the Archimedes, MEMC, was only designed to handle 4 Mbytes. It is necessary, therefore, to provide an extra MEMC for each additional 4 Mbytes of memory, and this requires careful design to ensure that all the MEMCs work properly together. For this reason, the Atomwide upgrade comes on two separate boards. The first of these contains two MEMCs placed physically close to each other on a board which sits under the disc drive(s) and plugs into the existing MEMC socket on the main circuit board. This is connected via a 34-way ribbon cable to the memory board itself, which plugs into the backplane, occupying the co-processor slot. On one half of this board are eight RAM chips and a few other components, while the second half of the board is completely blank. I am sure Atomwide has not arranged this accidentally, which suggests that the rest of the board is earmarked for future expansion - 16 Mbytes perhaps? Both boards appear to have been well laid out and soundly constructed; at present the RAM chips are plugged in, though Atomwide says it may solder them in future for greater reliability. The upgrade must be fitted by an approved Acorn service centre, and the price in fact includes free collection, fitting and delivery by Atomwide itself.

USING 8 MEGABYTES

Switching on the machine supplied for review displayed the encouraging message "RISC OS 8192K" before entering the Desktop. In order to appreciate just what 8 Mbytes can do for you in a practical situation, I ran the following test.

First of all I configured the font cache to the maximum allowable 1 Mbyte, followed by a 2 Mbyte RAM disc. I put all my fonts in the RAM disc for fast access, which still left plenty of room for other applications in the RAM disc if required. Next I loaded Ovation, and opened a couple of documents. Then I loaded Paint and Draw and opened a couple of files in each, ready for editing or transferring to other applications. I installed Schema together with a fairly large spreadsheet file, a sticky backdrop for convenience, BEdit, a couple of small utilities, and a printer driver for the Calligraph ArcLaser. I chose a 320K multi-sync screen mode, and installed Atomwide's VIDCmodes utility to control its VIDC enhancer which was also in the machine. Finally, I loaded Edit to write this review. Even after reserving 1 Mbyte of free space for the ArcLaser to operate, I was still left with over 500K of free memory.

Atomwide 4 Mbyte board and MEMC extension

As you can see, I have simulated a professional DTP environment where text in a number of fonts, clip-art, sprites and even spreadsheets can be incorporated into a document without any necessity to rearrange memory usage as you work. It is quite obvious from all this that a 4 Mbyte machine would still leave something to be desired in such a situation, and compromises would have to be made along the way.

Examples of other areas in which large amounts of memory would be advantageous are image processing and software development, particularly when using compilers, linkers and libraries.

CONCLUSIONS

There is no doubt that, if you use your Archimedes for serious professional purposes, then the more memory you have, the more easily you can achieve the desired result. This is not to say that all those with unexpanded 310s should throw their computers away in disgust; we have already shown in the pages of RISC User that it is perfectly possible to venture into DTP using nothing more than Draw and Edit. In the end, it is a matter of compromise between your needs and your budget. The Atomwide upgrade is not cheap, but it appears to be well made, performs well, and represents good value for money if you are satisfied that you really need it.

Product	*8 Megabyte upgrade*
Supplier	*Atomwide* *23 The Greenway, Orpington* *Kent BR5 2AY* *Tel. (0689) 38852*
Price	*£977.50 inc. VAT*

• POINTS ARISING • POINTS ARISING • POINTS ARISING •

RHAPSODY REVIEW

(Volume 4 Issue 1)

In my review of Clares' Rhapsody, I omitted to mention an important feature of the package, which is that a MIDI instrument can be used to input music into a Rhapsody score. This can even be done in real time, so that you can play one part of the score and enter it into Rhapsody while the computer is playing the rest of the score. This is quite a significant feature of the package (provided that you have a MIDI instrument), and my apologies to Clares for the omission. **Alan Wrigley**

RISC USER VOLUME 3 SPECIAL DISC

On some early copies of this disc, the name of one directory is misspelt, causing problems when using the outline fonts. Check that the directory !NewFonts (in $.!RU_Vol3.Programs) contains a sub-directory called *Katiyo*. If this is misspelt (as *Katyo*), then simply rename the directory with the correct spelling. Note that Acorn's Outline Font Manager is not included on this disc.

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ARCade

A roundup of the latest games for the Archimedes & A3000 by Peter Rochford.

As usual, this time of year sees a plethora of new games releases ready for the Christmas spending spree.

This month in ARCade, we have twelve new games to take a look at and, because of this large number, I have had to devote just a small space to each one giving a brief picture of what's on offer.

FIREBALL II

First off we have a breakout-type arcade game from CIS called *Fireball II* (£24.95). This is a much enhanced and reworked version of the original Fireball game. Breakout games, for those who are not familiar, involve destroying a variety of brick walls with the aid of a bat and ball. Doesn't sound that exciting, eh? Well, some versions of this type of game can be downright boring after a few minutes play. *Fireball II* takes the whole concept to a new height by introducing an enormous number of extra features and variations.

Graphics are well-detailed, smooth and colourful. Sound is used sparingly but to good effect where necessary. There is a rather good music sound track using sampled sound that can be switched off if desired.

Fireball II can hardly be described as original in terms of basic game design, but the added enhancements and presentation make up for this to produce a satisfying and fun game with lasting interest. A bit pricey I feel for this type of game but recommended, nevertheless.

Fireball II

MICRODRIVE

Another new game from CIS, is *Microdrive* (£18.95). This is a 3D golf simulator to challenge 4th Dimension's popular Holed Out series.

Microdrive takes things a stage further than Holed Out by providing a true 3D landscape, complete with hills and slopes. Therefore the course must be 'read' to play it rather than assuming you are playing on a billiard table surface. The ball will bounce off hills and roll down slopes giving a very realistic feel to the game.

All game control is via the mouse and is relatively straightforward. After a club is selected, and also the direction of shot, control of the shot is from positioning of the club during the swing. There is no power meter as in Holed Out. This again, adds to the realism of the game.

Graphics are excellent and provide a real sense of true perspective. There is plenty of detail in the scenery although this has the drawback of slowing down each new view as it is drawn on screen.

The game is easy to control but requires a lot of practice to master. Don't let that put you off though, as this is an excellent, well thought out and programmed game. Even if you already have Holed Out, I am sure that *Microdrive* will be a welcome addition to your games collection. Highly recommended.

SUPERIOR GOLF

Superior Software has been slow to issue new software for the Arc, despite its long association with Acorn machines. To join Holed Out and Microdrive, Superior has released its own golf simulation, *Superior Golf Plus Construction Set* (£18.95). This provides a selection of courses to play, and allows the creation of your own with a course designer.

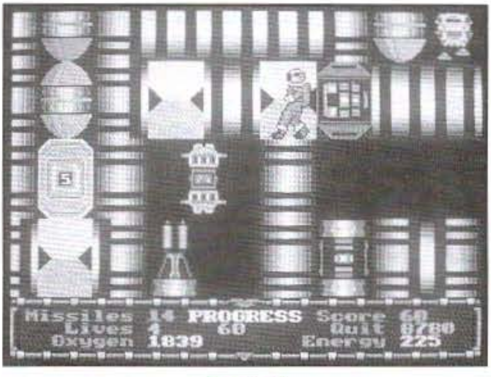
I wasn't too impressed overall with this game from the outset, so I won't spend too much time on it. The graphics lack real detail and are somewhat chunky, making the whole thing look rather tacky. The biggest criticism, however, is the method of game control, which is via the mouse, but is so overly complicated. The net result is that early attempts to play are so frustrating that you quickly start to lose interest, with so many attempts to get the ball moving.

I can't summon up any enthusiasm for this game at all. It is rather dire, to say the least, and very disappointing coming from Superior. Buy CIS' *Microdrive*!

REDSHIFT

Minerva has one new release this time called *Redshift* (£17.05). This is a vertically scrolling shoot-'em-up of a similar ilk to the old favourite Zaxxon. On the Arc, it is comparable to games like Quazar and Alerion.

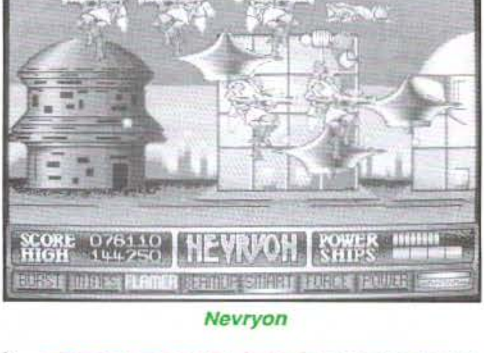
Not a lot new here in *Redshift*. The graphics are pretty ordinary and sound is just about OK. Speed of scroll is quite stunning and rather too fast for my eyes to keep up with. There is not much detail in the game, and most of the time is spent avoiding static hazards rather than hordes of screaming marauding aliens.



Pysanki

Control of the game is via the keyboard only, and the keys chosen are not redefinable. This is plain daft. The game uses the cursor keys for forward, reverse and left/right movement along with Alt for fire. This arrangement may be fine for contortionists, but mere mortals like me find this arrangement absurd.

Not the most exciting game from Minerva and not the best in terms of gameplay, and so not recommended.



Nevryon

FOUR FROM 4TH DIMENSION

4th Dimension continues its assault on the Arc games scene with four new offerings in time for the festive season.

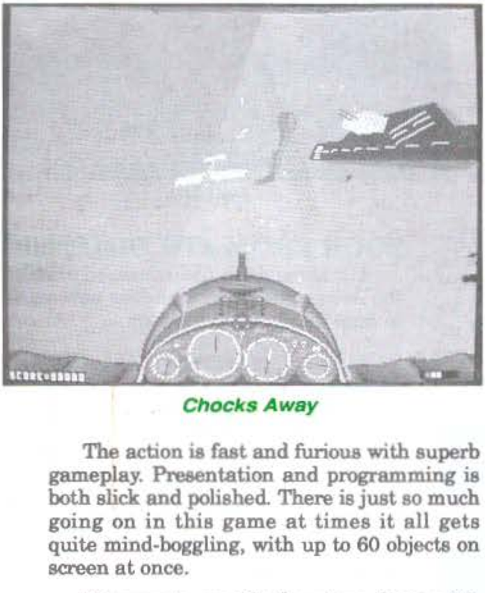
Pysanki (£18.95) is an arcade-type graphic adventure which is a Repton lookalike with a few enhancements and variations. 4th Dimension did the same trick with Man-At-Arms and I wasn't impressed by that either. I won't go into any great detail over this game. It is the usual scenario with hazards to avoid and treasures to collect as you whizz around a network of tubes.

Why 4th Dimension has bothered with this I do not know. Perhaps it feels there is mileage in re-hashing old 8 bit type games on the Arc that provide only more colours and better sound. Disappointing.

In true pioneering spirit, 4th Dimension is the first Arc software house to release a compilation of past 'hits'. *The Real McCoy* (£28.46) is a four game compilation featuring Quazar, Arcade Soccer, UIM and White Magic.

I've looked at all these games in past editions of ARCade, so I won't waste space here going over old ground. Suffice to say, none of these games were big sellers on their own, and this is an obvious reason to put them out on a compilation. As such it provides excellent value for money even though the games are not that strong. If you do not have them already, this collection is a worthwhile buy.

4th Dimension has a real winner though in *Nevryon* (£19.95). This is a sideways scrolling shoot-'em-up par excellence. Multi-layer parallax scrolling, digitised music and sound effects, plus some stunning 256 colour graphics, make this game one of the best yet on the Arc.



Chocks Away

The action is fast and furious with superb gameplay. Presentation and programming is both slick and polished. There is just so much going on in this game at times it all gets quite mind-boggling, with up to 60 objects on screen at once.

Nevryon is supplied on two discs with over 1.5MBytes of code. Quite simply this game is a must, and shows what the Arc is really capable of producing. Highly recommended.

Chocks Away is a bi-plane flight simulator and is set to be another success for 4th Dimension. You are the pilot of a World War I bi-plane and you have 20 missions to fly and complete. Along with this are training flights, stunt flying and dog fights.

The game features some 90 minutes of flight demos to help you learn how to fly and show you just what can be done. This includes take-off and landing on the decks of an aircraft carrier!

There is a two-player option in which you can have dogfights with a friend, and the ability to record your flights on a 'black box' and replay them afterwards.

Graphics in the game are superb, smooth and with plenty of ground detail. Sound is equally good, with a very realistic engine sound that varies well with throttle settings.

Overall this is a really enthralling flight simulator that is easy to control and with plenty of variation and features to ensure longevity. I personally prefer this one to Interdictor, and found it one hell of a lot of fun. Highly recommended.

Finally from 4th Dimension is *Drop Ship*. You may recall my review of Caverns and Rotor in a previous ARCade. *Drop Ship* is in the same vein as both these games. You pilot a spaceship under forces of gravity around a labyrinth of 'caves' to try and collect power crystals to prevent the nuclear reactors from going into meltdown.

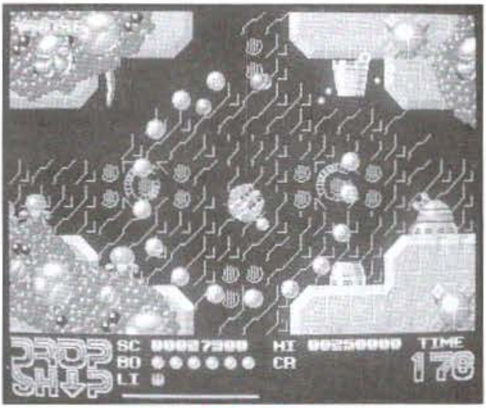
It's not all that straightforward as you can imagine. There are plenty of hazards to avoid, plenty of aliens to thwart you, and a constant need to refuel. Couple this with a wicked gravitational force that drags you closer to the walls and instant death, and you have the recipe for a real stinker of a game. I like it!

Compared to both Rotor and Caverns, this game has to be tops. The gameplay is even more difficult than both these and the graphics and sound far better. Recommended.

KRISALIS' UNITED

Next, a release from a software house new to the Arc. *Manchester United* is a football game from Krisalis Software. This game is already out on the ST and Amiga and has received rave reviews.

The game can be played as a straight arcade game or as a combination of management and arcade. You can select your team players and try to manage your team through a season in the English football league and play each game.



Drop Ship

The arcade side of the game can best be described as superb. You are presented with a 3D view of the pitch in much the same way as on TV. The graphics and animation are some of the best yet on the Arc and the attention to detail quite remarkable.

Only disappointment with this game is the sound. The background noise of the crowd is tedious to say the least. Apart from that the whole thing is a pleasure to play and should provide hours of enjoyment. Highly recommended.

LA BALLARENA

Finally, a new and diabolical version of the breakout type of game referred to earlier, has emerged from a small French software house (Sisteme) in the form of *Ballarena* (£19.95). This one is played 'in the round', so left and right reverse as you move through 360. With background music and synthesized voice comments ("Oh yeah") this is a baffling but addictive game.

That's it for this month and indeed, another year. May I wish you and yours a very Merry Christmas and Happy New Year. See you in '91!

All games referred to above can be obtained direct from BEEBUG (but remember to add postage), except for Ballarena which is available direct from Sisteme, BP3, 4 rue de Massacan, 34740 Z.I. Vendargues, France.

RU

Archimedes Colour Monitors £85

BEEBUG has received a trade-in consignment of medium resolution 16" colour monitors, manufactured for Cameron Communications who are well known in the professional video field. These monitors are guaranteed for three months.

These amazing monitors are packed with interface including RGB for use on the BBC and Master, SKART for the Archimedes, as well as Video and Audio In for use with a video recorder or camera. Suitable also for PCs in CGA mode. Other interfaces include Auxiliary, Host, Slave for use as terminals. Dimensions are 430mm (D) x 400 (W) x 350 (H). All this for only **£85** inc VAT! (Code 0548)

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18 September 1990

Dear RISC User Reader,

Have you noticed how it is often easier to type letters than wordprocess them? The reason is simple - wordprocessors are designed to write substantial documents and so they take too long to set up for a short letter. And wouldn't it be nice if you could have your own prestigious letterheading added automatically?

Express Software have now produced a solution - FastWriter. FastWriter is a wordprocessor which is designed just for writing letters - so it can have lots of short-cuts to make it quick and easy. But Express Software have not economised on facilities - you can have **bold**, *italic*, underline, superscript and subscript; you can change font in the middle of your letter; you can use your own personalised letterhead designed in !Draw; you can check your spellings; you can do marked move, copy, delete and save operations.

We at Express Software realise this is something new - something it is difficult to get across on an A5 page! But there are two reasons why you should believe us - firstly this advert was prepared in it (it was printed out on an LC24-10 as well - lasers are not needed for good results). Secondly we have prepared a demo disc at only £5.00 so that you can try it for yourself.

Please send CWO if ordering just the demo disc - otherwise you can choose credit or CWO. If you are under 18, cheque with order please. Sorry, no credit cards.

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____

Please send me: ☐ FastWriter discs @ £39.95

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Signed ____________________

Impression

Clive Gringras takes over our WP/DTP slot this month with some advice on using DTP in letter writing, and reactions to the latest release of Impression 2.

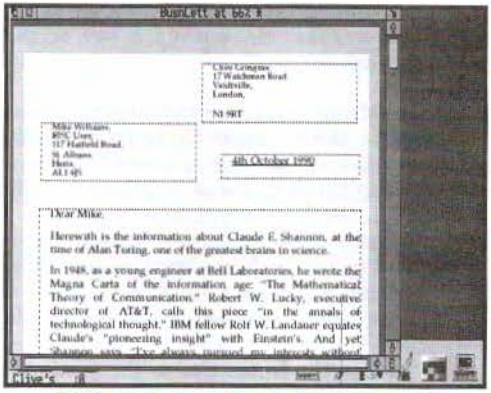
Computer Concepts' DTP package has certainly made an impact in the Archimedes market. The presentation of the manual, organisation of the program, and even the advertisements have set a precedent for the quality of future Archimedes releases. Software of this standard only increases the attractiveness of the Archimedes to professional users.

However, it is easy to get carried away with the use of DTP, creating fancy and stylish layouts for all sorts of applications. Users also have a tendency to learn but part of the software's capabilities, and yet believe that they are making full use of all its features. At the other extreme, many users overlook the use of DTP for more mundane activities, such as letter writing. Although my comments relate specifically to the use of Impression, they could apply in principle to the use of any DTP package.

LETTER WRITING

Writing letters with a DTP package often seems more difficult than producing more sophisticated newsletters and posters. A friend of mine uses Impression for a weekly newsletter but still writes the covering letter using 1st Word Plus! Impression, and most other existing DTP software, can cope admirably with writing professional looking business letters.

Such documents generally have the same format regardless of the person to whom they are written. This is a perfect candidate for spending some time in designing the *Master Pages* which will govern the overall look of the letter. Two



Clive Gringras
17 Watchmen Road
Vauxville,
London,

N1 9RT

Mike Williams,
RISC User,
117 Hatfield Road
St Albans
Herts
AL1 4JS

4th October 1990

Dear Mike,

Herewith is the information about Claude E. Shannon, at the time of Alan Turing, one of the greatest brains in science.

In 1948, as a young engineer at Bell Laboratories, he wrote the Magna Carta of the information age: "The Mathematical Theory of Communication." Robert W. Lucky, executive director of AT&T, calls this piece "in the annals of technological thought." IBM fellow Rolf W. Landauer equates Claude's "pioneering insight" with Einstein's. And yet Shannon says "I've always pursued my interests without

Designing a letterhead with Impression

Master Pages need to be defined. The first is the front page containing the addresses, date and opening few paragraphs. The second is used for all subsequent pages, simply being a page of writing with a page number at the foot.

Including the address of the recipient in the top left-hand corner of a letter is useful, and gives a professional appearance. It also means that letters stored on disc provide a complete record, including the details of the addressee. The address also allows us to use window envelopes, hence saving time. The first problem is in setting the page template or Master Page to ensure the recipient's address will always be within the window and not be obscured as is often the case.

To use a window envelope as a guide, rip off the plastic window from inside. Fold an A4 sheet of paper making the distance from the crease to the top of the paper about 5mm less than the height of the envelope. Insert this paper into the envelope pushing the crease to the bottom left so that the part of the paper which will contain the address is visible. Draw inside the window shape on the paper. This area will be exactly reproduced on our Master Page. Measure the dimensions of the window, the distance down and across to the top left-hand corner of the window and the vertical distance down to the crease. Here endeth the origami lesson!

Measuring paper and folds may appear to be the furthest thing from Desktop Publishing, but this precision is the key to using the features of Impression to their full. Within Impression select an A4 Master Page (generally Master Page 2) and using the *New Frame* option, place a frame anywhere on the page of the approximate proportions of the envelope window. Within the *Alter Frame* option, change the frame size to the precise size needed, and position it correctly by typing in the measurements taken from the paper earlier. This frame will contain the address of the person due to receive the letter. Copy this using the *Edit* option and place the copy above the first frame and to its right. This frame is for your own name and address.

As this Master Page will be used for all future correspondence, your name and address details can be entered into the actual Master Page frame. The style menu should be used to set up a style called Address. A serif font such as Pembroke or Trinity is advised. A point size of 14 with identical line spacing provides six lines for the address, assuming the paragraph spacing is zero.

To finish this Master Page, two further frames should be defined (see illustration). The first is a long thin frame below your address to contain the date of writing. Impression will handle this for you automatically if you select the *Insert Current Date* option via the *Misc* menu. The second is the main writing frame, which should begin where the crease was made to fold the letter. Generally the same font would be used for the whole letter, changing only the size for different frames. My preferences are to use 14 point, left-justified Pembroke Medium for both addresses and 18 point, fully-justified Pembroke Medium for the writing and the date.

The address to which the letter is to be sent is contained in one unlinked frame. This gives the advantage of being able to use a simple address book from Edit. Each address should be entered in an Edit text file with a Return at the end of each line. With Impression and Edit both installed, click on the address frame in the document (NOT the Master Page) and then enter Edit. Use the *Edit Find* option to locate the name and address required. Simply select this name and address and save this into the address frame by dragging the Edit file icon onto the highlighted frame.

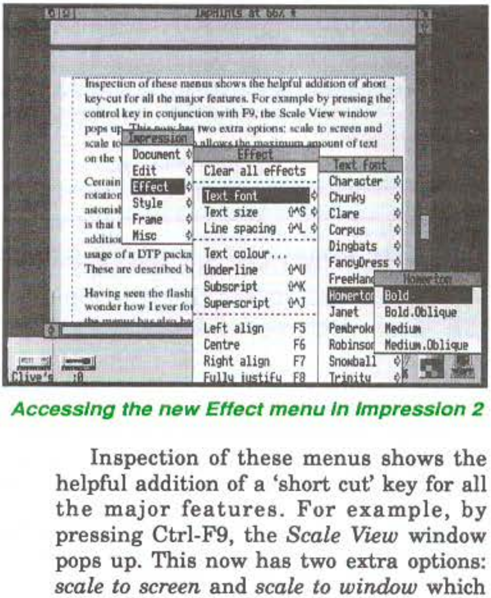
Having done the measuring groundwork, you will be able to produce high quality letters, containing as standard, your address, the date and a destination address perfectly enclosed within a envelope window. The actual printed quality of the letter obviously depends on the type of printer you are using. However, a word of warning about printing: the Master Page you have set up does not take into account the printer borders. These should be adjusted to zero to ensure the letter is printed WYSIWYG.

IMPRESSION 2

Since the release of Impression, numerous upgrades have been available to existing users at no additional cost. Initially these upgrades were mainly bug-fixes. However, Computer Concepts also began putting additional features into the program.

This has lead to their most recent "upgrade" in the form of Impression 2, a totally re-vamped and enhanced package. There is no upgrade cost to Impression 2, although I would strongly recommend users to take up the offer of a totally revised manual, extra fonts and utilities for only £20.00. The entire package is due to cost £169.95 to first-time buyers.

Thankfully Impression 2 has the same layout and chic style of Impression, and in no time at all users can familiarise themselves with the slightly altered menu system. This now consists of six options rather than five.



Inspection of these menus shows the helpful addition of short key-cut for all the major features. For example by pressing the control key in conjunction with F9, the Scale View window

Accessing the new Effect menu in Impression 2

Inspection of these menus shows the helpful addition of a 'short cut' key for all the major features. For example, by pressing Ctrl-F9, the *Scale View* window pops up. This now has two extra options: *scale to screen* and *scale to window* which allow the maximum amount of text on the window/screen to be shown.

Certain features within the package are quite new. For example, real-time rotation and grey-scale dithering of sprites are quite astonishing. My main reason for liking Impression 2 is that the original Impression core has been retained. The additions that have impressed me are not fundamental to the use of a DTP package, but undoubtedly make life far easier. These are described below. Having seen the flashing cursor in Impression 2, I begin to wonder how I ever found the caret before. The menu structure has also been reorganised. The increasing number of fonts now available for the Archimedes lead to ridiculously long font selection windows. Impression 2's hierarchical font menus eliminate this annoyance.

Using paragraph styles within DTP is excellent when dealing with large areas of text. Now individual words can be restyled separately using a new *Effect* menu. Page management by rulers in Impression was only applicable to individual styles. Impression 2, as a word processor might, allows a ruler to be defined to govern the entire text in a frame or document.

Impression 2 allows your own borders created as Draw files to be placed around frames. I don't expect it will be long before discs full of suitable borders emerge in the clip-art world!

Impression 2 not only exhibits new features and improved ease of use, but the programmers have also managed to increase the speed of most of Impression's more time-consuming operations. The manual is significantly different from the first edition. It is less chatty but I found it easier to locate items of interest.

Impression 2 is not radically different from Impression, but to my mind this release has been a wise move on CC's part.

We invite other readers who have gained worthwhile experience in the use of DTP or word processing on the Archimedes to contact us if they believe they could contribute to our WP/DTP pages. Just write to the editor with an outline of your proposed article. The more widely ranging the experiences of our authors, the more other readers will be able to benefit. Note that we do pay for all articles published in RISC User. RU

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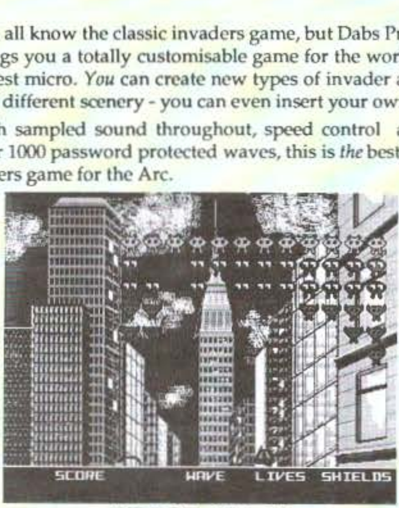

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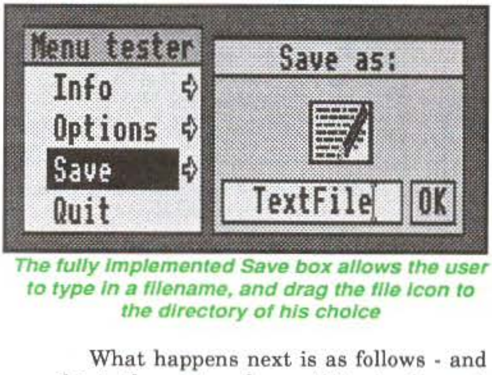
Mastering the Wimp

Part 14: Implementing a Drag-Save contd.

by Lee Calcraft

THE FOUR-PART PROTOCOL

Last month we got halfway through implementing a Save box function. This causes a "Save as:" dialogue box to appear on the screen when the pointer is moved across the Save option on the icon bar menu. The user can then type in a file name and drag the file to the directory of his choice, where it will be saved. In our implementation we got as far as calling SYS "Wimp_DragBox" in response to the appropriate button_pressed event. This SYS call creates a dotted rectangle which moves with the pointer until the drag is complete. When the user releases the mouse button, the Wimp returns a reason code of 7 (User_Drag_Box) to our task.



The fully implemented Save box allows the user to type in a filename, and drag the file icon to the directory of his choice

What happens next is as follows - and this is the part we have still to implement. In response to reason code 7 returned by the Wimp Poll, our application must call SYS "Wimp_GetPointerInfo" to find out where the drag ended in terms of pointer co-ordinates and of window (and possibly icon) handle.

The application then sends a DataSave message containing the leafname of the file to be saved. The leafname is the name of the file as supplied by the user (or as supplied by the application as a default) without a corresponding pathname.

If it is interested, the destination application then replies with a DataSaveAck message directed back to our task, which contains the full pathname for the save operation. Our application will need this, since it is ultimately our application which will execute the command to save the data.

The DataSaveAck message is picked up by our application (via Wimp Poll reason codes 17/18), which uses the full pathname to actually save the file. Our application then sends a DataLoad message to the destination task, which in turn replies with a DataLoadAck message.

The last two messages in this protocol sequence are quite redundant for the case in point, but must be sent for consistency with the more complex case of data saves which do not involve the Filer application. In such cases, there is an intermediate stage in the saving process, since the task performing the save will not know how to load data *into* the destination task (in the special case where the Filer is the destination, the sending task can perform the whole operation).

What happens in the more general application-to-application save is that, after receiving the DataSave message, the destination task returns not the pathname for use with the filer, but a system variable such as <Wimp$Scrap>. This holds the full pathname of a special file to be used for temporary file storage. By default, <Wimp$Scrap> holds the full path to !System.ScrapFile. The task performing the save, saves the file using the name supplied, and then sends the DataLoad message. This now comes into its own, since it informs the destination task that it should load the temporary Scrap file, and then delete it. When it has done this the destination task acknowledges the successful completion of the process by sending a DataLoadAck message. If the destination task does not acknowledge at this stage, it is the responsibility of the task performing the save to delete the unused scrap file, and to generate an error with the message "Data transfer failed: Receiver died". Note here that a more efficient form of application-to-application transfer using RAM to hold the file in transit is also catered for - see the PRM page 1266 for further details.

IMPLEMENTING THE CODE

Fortunately it takes relatively little code to implement these features. The code given in listing 1 should be typed in carefully at the end of our much-extended program. To make our application respond to Wimp Poll reason code 7, insert the following line into DEFPROCpoll (at around line 640):

```
WHEN 7:PROCinitiatesave
```

On entry
R1=Pointer to block

On exit the block contains the following

R1+0	mouse x (in screen co-ordinates)
R1+4	mouse y
R1+8	button state
R1+12	window handle (-1=bcgnd -2=icon bar)
R1+16	icon handle

Table 1. SYS "Wimp_GetPointerInfo" SWI &400CF

The procedure called here forms part of the listing, and its purpose is to obtain the graphics co-ordinates and window handle (and icon handle if appropriate) at the point where the drag ended. Table 1 gives the data structure returned by SYS "Wimp_GetPointerInfo", while table 2 gives the data structure required by SYS "Wimp_SendMessage" for messages of type DataSave. You will note that since we are using the same block of memory for both calls, we need to be a little careful about the order in which we take data from the first call and move it around in preparation for making the second.

Once PROCinitiatesave has been called, our task will have sent a DataSave message to the destination task supplying the leafname of the file to be saved. The next thing to happen as far as our task is concerned is that, providing that the drag terminates at an object owned by a task which can respond to a drag, our task will receive a DataSaveAck message containing the full pathname for the save.

R1+0	length of block (20-256 bytes)
R1+4	not used on entry
R1+8	not used on entry
R1+12	your_ref (=0 - originating)
R1+16	message action (=1)
R1+20	destination window handle
R1+24	destination icon handle
R1+28	destination x coord
R1+32	destination y coord
R1+36	estimated size of data
R1+40	file type of data
R1+44	leafname of data, zero-terminated

Table 2. Data block used for DataSave message

We can pick this up by placing a new line into DEFPROCreceive at around line 2390:

```
WHEN 2:PROCdatasave
```

This responds to messages of type 2 (DataSaveAck) by calling PROCdatasave. This new procedure (see listing 1) places the full pathname of the object into fullname$ - the WHILE loop is necessary because the string returned by the destination task is zero-terminated. At last the data is actually saved (by calling PROCsaveit), and the DataLoad message is finally sent.

One particular point to note in this procedure concerns the updating of the Save name in the line just below the call to PROCsaveit:

```
IF block%!36>-1 THEN $sbtext%=fullname$
```

This only updates the filename in the save box icon if the DataSaveAck block has a value greater than -1 at block%+36. This location normally gives the estimated size of the file, but if it is -1 it means that the file saved is not *secure*. In other words, it was not saved away to a filing system, but was used in some other way. For example it might have been dragged to another application. In such cases an application should not update the filename used by the Save box, nor should the task's data be marked as *unmodified* (as occurs in such applications as Edit after a secure Save), nor should the new pathname be used as a document's window title.

Finally we must respond to a failure on the part of the destination task to complete the load operation. We have used reason code 18 rather than 17 for our DataLoad message to the destination task. Code 18 gives the message a 'recorded delivery' status, such that if our message is not acknowledged by the receiving task, the Wimp will send the message back to us ('return to sender' to keep to the postal metaphor). The message is exactly as we sent it, except that it now has a reason code of 19.

So to pick up a failure on the part of the destination task to load a file which it has specifically confirmed that it wanted to accept, we can just look out for a Wimp Poll reason code of 19. If you insert the following line into the Wimp Poll loop in DEFPROCpoll at around line 670 in the program, this will do the trick:

```
WHEN 19:SYS"OS_File",6,block%+44:ERROR
255,"Data transfer failed: Receiver died"
```

Before the Wimp will return reason code 19 to our task, we must however alter the mask used with SYS "Wimp_Poll". To achieve this, alter the value &81831 used early in DEFPROCpoll at around line 580 to &1831.

These alterations will cause our task to respond to a Wimp Poll reason code of 19 by deleting the file whose full pathname appears in the returned message block at block%+44. Our task then generates the appropriate error (handled by the program's error handler FNwimperror). Since our task only issues one reason code 18 message (the DataLoad message at the end of PROCdatasave), we do not need to check the my_ref field in the returned message to see which particular message of ours failed to get a response.

If you now run the program you should see that it behaves as expected. You can type in a simple filename without a path, and drag this to a directory viewer, where it will be saved. If you select the Save option a second time, the full pathname of the last save will appear in the dialogue box, and you can save the file using the previous name simply by clicking on the OK box, or pressing Return. When you do this, however, the menu and Save box remain on screen. To remove them from view, we need to add a single line immediately before the ENDPROC of PROCsaveit:

```
SYS "Wimp_CreateMenu",,-1
```

This makes the menu structure and any leaf objects emanating from it disappear.

This now completes the implementation of the Save box. It has taken us two months to cover, and involves quite a bit of coding. It is a sobering thought that if you are using ANSI C and Acorn's RISC OS library instead of Basic, the whole job can be performed by a single call to the function *saveas*.

TIDYING UP

This issue sees the last of our much extended Wimp testbed program, but before it takes its final bow, there are three minor points that I would like to tidy up. Firstly, when the Save box is called initially it should ideally offer a

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default leafname. We could use the name "TestText" for this, as follows. In DEFPROCcreatesavebox, alter the line which begins "DIM sbtext%" to read:

```
DIM sbtext% &FF:$sbtext%="TestText"
```

Secondly, the Wimp guidelines give a preferred form in which to display error messages. Instead of the old faithful "<message> at line <line number>" format, it is suggested that all Wimp tasks written in Basic use the form "<message> (internal error code <line number>)". To achieve this, alter the third line of DEFFNwimperror to:

```
 $(block%+4)=REPORT$+" (internal error
code "+STR$ERL+")"+CHR$0
```

Thirdly, the height of the icon bar menu is not quite as it should be, and incorrectly depends on the number of items in the second level menu. To correct this, reverse the order of the two calls to PROCdrawmenu early in the program (at around line 340), and alter the last parameter of PROCshowmenu (called in DEFPROCbuttons at around line 1680) from 3 to entries%. If you are adding other sub-menus to the menu structure by further calls to PROCdrawmenu at the initialisation stage, you will need to ensure that the call to PROCmenu which creates the top level menu is called last. This is so that the variable *entries%*, which is supposed to hold the number of entries in the top level menu, and is used for calculating its height, remains valid.

Next month we will take a look at the Template Editor. This powerful tool greatly simplifies Wimp programming, and will allow us to write a complete multi-tasking application in just 25 lines of Basic - of course to make it do anything useful will take a little more.

We shall be including a copy of the Template Editor on next month's magazine disc for those who do not already have a copy of this excellent utility.

```
 6000 DEFPROCinitiatesave
 6010 REM send datasave mess to dest tsk
 6020 SYS "Wimp_GetPointerInfo",,block%
 6030 block%!20=block%!12:REM wind hndle
 6040 block%!24=block%!16:REM icon hndle
 6050 block%!28=block%!0 :REM x co-ord
 6060 block%!32=block%!4 :REM y co-ord
 6070 block%!36=length%  :REM apprx size
 6080 block%!0=64        :REM block len
 6090 block%!12=0        :REM your_ref
 6100 block%!16=1      :REM mess actn=save
 6110 block%!40=&FFF     :REM filetype
 6120 $(block%+44)=FNgetleaf($sbtext%)
 6130 REM send DataSave message
 6140 SYS "Wimp_SendMessage",17,block%,b
lock%!20,block%!24
 6150 ENDPROC
 6160 :
 6170 DEFFNgetleaf(name$)
 6180 WHILE INSTR(name$,".")
 6190   name$=MID$(name$,INSTR(name$,"."
)+1)
 6200 ENDWHILE
 6210 =name$+CHR$(0)
 6220 :
 6230 DEFPROCdatasave
 6240 REM get full pathname
 6250 fullname$=""
 6260 a%=0
 6270 b%=block%?(44+a%)
 6280 WHILE b%<>0
 6290   fullname$+=CHR$(b%)
 6300   a%+=1
 6310   b%=block%?(44+a%)
 6320 ENDWHILE
 6330 PROCsaveit(fullname$,start%,length
%)
 6340 REM only update filename if secure
 6350 IF block%!36>-1 THEN $sbtext%=full
name$
 6360 block%!12=block%!8
 6370 block%!16=3
 6380 !block%=256
 6390 REM send DataLoad message
 6400 SYS "Wimp_SendMessage",18,block%,b
lock%!20,block%!24
 6410 ENDPROC
```

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Assembler Workshop

A Contracting Heap Manager

by Christopher Willmot

In the first part of our look at heaps, two months ago, we explained how heap-type structures help memory management, and looked at the different types of heap. As promised, in this article we will present a contracting heap manager that can easily be incorporated into your own programs.

The heap manager described here is a fully relocatable ARM code program which is loaded into memory when needed. Typically, a Basic program would claim an area of memory using DIM, and then load the heap manager into that area. The heap itself uses memory above Basic's normal limit of HIMEM, and hence appears transparent to Basic. The memory needed to make up the heap is claimed directly from the memory-management part of the Window Manager using the call SWI "Wimp_SlotSize", and given back in a similar fashion when no longer needed. This is used in preference to the END= statement in Basic, as the latter has the rather unfortunate effect of wiping the Basic stack. This forces the call to be issued outside of any program structures or functions; hardly good programming practice.

The fact that our heap manager interfaces to the Window Manager means that it can only be used when the Desktop is active. This doesn't necessarily imply that it can only be used in multi-tasking programs though - it can be used in any program that is run from the Desktop, or even from the command line obtained by pressing F12. However, in the case of a stand-alone, non multi-tasking, application, a contracting heap is overkill anyway. As no other applications will contend for memory, it is sufficient to use the standard RISC OS SWI "OS_Heap" as described in the previous article.

The interface to our heap manager is via a number of entry points at the start of the code. These fall into two sets - one set suitable for use from Basic, which uses standard variables to pass parameters and receive results, and the other for machine code accesses which pass values in processor registers.

The four Basic entries are:

`CALL setup, heapbase%`

to initialise the heap, the address of which is given by the variable *heapbase%*.

`CALL fetch, block%, blocksize%`

to claim a block of length *blocksize%* from the heap and return its address in the variable *block%*. (The actual size claimed is eight bytes higher than that requested to allow room for some internal data.)

`CALL extend, block%, extra%`

to change by the amount given in *extra%* the length of the block pointed to by *block%*. The change can be negative to decrease the size of the block, or positive to increase it. It is important to note that this call can change the address of the block, in which case *block%* will be updated, and the block's contents moved.

`CALL return, block%`

to release the block pointed to by *block%*.

The labels *setup*, *fetch*, *extend* and *return* are set up when the code is assembled, and correspond to: code+0, code+4, code+8 and code+12, where code is the address at which the code is assembled or loaded.

The machine code entry points perform the same functions as the Basic entries. Their labels and offsets in the code are:

+16	scode	initialises heap at R0
+20	fcode	fetches block size R0, leaves with address in R2
+24	rcode	returns block at R0
+28	ecode	extends block at R0 by amount in R3

Finally, code+32 contains the address of the heap itself, for reference, and code+36 the page size used by the Window Manager.

To use the heap manager, type in the listing given below and save it. When run, the program will assemble and save the code with the name *HeapCode*, and will also present you with a menu to test the routines. This allows you to claim, release and extend blocks, and also displays the amount of memory claimed from the Window Manager at any time.

To use the heap manager in your own code you should set up the heap as in the program given here, and use the appropriate CALLs to control the heap. This month's magazine disc contains a fully commented listing of the source code.

```
   10 REM          > Heap
   20 REM Program   Heap Manager
   30 REM Version   1.00
   40 REM Author    Christopher Willmot
   50 REM RISC User December 1990
   60 REM Program   Subject to Copyright
   70 :
   80 progsize%=200<<10
   90 pagesize%=1<<10
  100 freespace%=&8000+progsize%
  110 END=freespace%+pagesize%
  120 HIMEM=freespace%
  130 size=&2000:REM bytes allocated for code
  140 DIM mcode size
  150 FOR pass=8 TO 11 STEP 3
  160 P%=mcode: L%=mcode+size
  170 [OPT pass
  180 ; Vectors to routines
  190 .setupv:         B      setup
  200 .fetchv:         B      fetch
  210 .returnv:        B      return
  220 .extendv:        B      extend
  230 .fcode           B      fetchcode
  240 .rcode           B      returncode
  250 .ecode           B      extendcode
  260 :
  270 .freeheap:       EQUD   0
  280 .pagesize:       EQUD   0
  290 :
  300 OPT pass AND &E
  310 .param
  320 STMFD   r13!,{r1-r2}
  330 LDR     r2, [r9,#4]
  340 CMP     r2, #4
  350 ADRNE   r0, errparams
  360 SWINE   "OS_GenerateError"
  370 LDR     r2, [r9]
  380 LDRB    r0, [r2,#3]
  390 LDRB    r1, [r2,#2]
  400 ORR     r0, r1,r0,LSL#8
  410 LDRB    r1, [r2,#1]
  420 ORR     r0, r1,r0,LSL#8
  430 LDRB    r1, [r2]
  440 ORR     r0, r1,r0,LSL#8
  450 ADD     r9, r9,#8
  460 SUB     r10,r10,#1
  470 LDMFD   r13!,{r1-r2}
  480 MOV     pc, r14
  490 :
  500 .errparams
  510 EQUD    &900: EQUS "Only integer parameters allowed": EQUB 0: ALIGN
  520 .setup
  530 STMFD   r13!,{r14}
  540 CMP     r10,#1
  550 ADRNE   r0, errsetup
  560 SWINE   "OS_GenerateError"
  570 BL      param
  580 BL setupcode
  590 LDMFD   r13!,{r14}
  600 MOV     pc, r14
  610 :
  620 .errsetup: EQUD   &901: EQUS    "No base address": EQUB 0: ALIGN
  630 .fetch
  640 STMFD   r13!,{r14}
  650 CMP     r10,#2
  660 ADRLT   r0, errfetch
  670 SWILT   "OS_GenerateError"
  680 BL      param
  690 BL      fetchcode
  700 MOV     r0, r2
  710 LDR     r2, [r9,#4]
  720 CMP     r2, #4
  730 ADRNE   r0, errparams
  740 SWINE   "OS_GenerateError"
  750 LDR     r2, [r9]
  760 STRB    r0, [r2]
  770 MOV     r0, r0,LSR#8
  780 STRB    r0, [r2,#1]
  790 MOV     r0, r0,LSR#8
  800 STRB    r0, [r2,#2]
  810 MOV     r0, r0,LSR#8
  820 STRB    r0, [r2,#3]
  830 LDMFD   r13!,{r14}
  840 MOV     pc, r14
  850 :
  860 .return
  870 STMFD   r13!,{r14}
  880 CMP     r10,#1
  890 ADRNE   r0, errreturn
  900 SWINE   "OS_GenerateError"
  910 BL      param
  920 BL returncode
  930 LDMFD   r13!,{r14}
```

```
 940 MOV    pc, r14
 950 :
 960 .extend
 970 STMFD  r13!,{r14}
 980 CMP    r10,#2
 990 ADRLT  r0, errfetch
1000 SWILT  "OS_GenerateError"
1010 BL     param
1020 MOV    r3 ,r0
1030 BL     param
1040 BL     extendcode
1050 SUB    r9, r9,#8
1060 MOV    r0, r2
1070 LDR    r2, [r9,#4]
1080 CMP    r2, #4
1090 ADRNE  r0, errparams
1100 SWINE  "OS_GenerateError"
1110 LDR    r2, [r9]
1120 STRB   r0, [r2]
1130 MOV    r0, r0,LSR#8
1140 STRB   r0, [r2,#1]
1150 MOV    r0, r0,LSR#8
1160 STRB   r0, [r2,#2]
1170 MOV    r0, r0,LSR#8
1180 STRB   r0, [r2,#3]
1190 LDMFD  r13!,{r14}
1200 MOV    pc, r14
1210 :
1220 .setupcode
1230 STR    r0, freeheap
1240 SWI    "OS_ReadMemMapInfo"
1250 STR    r0, pagesize
1260 MVN    r0, #0
1270 MVN    r1, #0
1280 SWI    "Wimp_SlotSize"
1290 ADD    r2, r0,#&8000
1300 LDR    r1, freeheap
1310 SUB    r3, r2,r1
1320 MOV    r0, #0
1330 SWI    "OS_Heap"
1340 MOV    pc, r14
1350 :
1360 .errsetup  EQUD   &901: EQUS    "
No base address": EQUB 0: ALIGN
1370 :
1380 .fetchcode
1390 MOV    r7, r0
1400 .fetch1
1410 LDR    r1, freeheap
1420 MOV    r3, r0
1430 MOV    r0, #2
1440 SWI    "XOS_Heap"
1450 MOVVC  pc, r14
1460 ORR    r0, r15,#0
1470 TEQP   r15,r0
1480 MVN    r0, #0
1490 MVN    r1, #0
1500 SWI    "Wimp_SlotSize"
1510 MOV    r6, r0
1520 ADD    r5, r0,#&8000
1530 LDR    r4, pagesize
1540 ADD    r0, r0,r4
1550 MOV    r3, r0
1560 MVN    r1, #0
1570 SWI    "Wimp_SlotSize"
1580 CMP    r0, r3
1590 ADRLT  r0, errextra
1600 SWILT  "OS_GenerateError"
1610 SUB    r3, r0,r6
1620 LDR    r1, freeheap
1630 MOV    r0, #5
1640 SWI    "OS_Heap"
1650 MOV    r0, r7
1660 B      fetch1
1670 :
1680 .errfetch
1690 EQUD    &902: EQUS    "Size needed
": EQUB 0: ALIGN
1700 :
1710 .errextra
1720 EQUD    &903: EQUS    "Sorry, no m
ore memory available": EQUB 0: ALIGN
1730 :
1740 .returncode
1750 LDR    r1, freeheap
1760 MOV    r2, r0
1770 MOV    r0, #3
1780 SWI    "OS_Heap"
1790 .return1
1800 LDR    r3, pagesize
1810 RSB    r3, r3,#0
1820 MOV    r0, #5
1830 SWI    "XOS_Heap"
1840 BVC    adjust
1850 ORR    r0, r15,#0
1860 TEQP   r15,r0
1870 MOV    r0, #5
1880 SWI    "OS_Heap"
1890 MOV    pc, r14
1900 :
1910 .adjust
1920 MVN    r0, #0
1930 MVN    r1, #0
1940 SWI    "Wimp_SlotSize"
1950 ADD    r0, r0,r3
1960 MVN    r1, #0
1970 SWI    "Wimp_SlotSize"
1980 LDR    r1, freeheap
```

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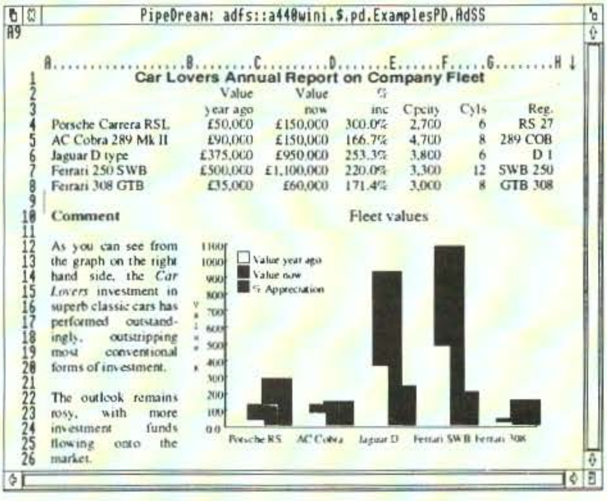
```
 1990 B         return1
 2000 :
 2010 .errreturn
 2020 EQUD    &904: EQUS    "No Return b
lock": EQUB 0: ALIGN
 2030 :
 2040 .extendcode
 2050 MOV      r7, r3
 2060 MOV      r8, r0
 2070 .extend1
 2080 MOV      r2, r8
 2090 LDR      r1, freeheap
 2100 MOV      r0, #4
 2110 SWI      "XOS_Heap"
 2120 MOVVC    pc, r14
 2130 ORR      r0, r15,#0
 2140 TEQP     r15,r0
 2150 MVN      r0, #0
 2160 MVN      r1, #0
 2170 SWI      "Wimp_SlotSize"
 2180 MOV      r6, r0
 2190 ADD      r5, r0,#&8000
 2200 LDR      r4, pagesize
 2210 ADD      r0, r0,r4
 2220 MOV      r3, r0
 2230 MVN      r1, #0
 2240 SWI      "Wimp_SlotSize"
 2250 CMP      r0, r3
 2260 ADRLT    r0, errextra
 2270 SWILT    "OS_GenerateError"
 2280 SUB      r3, r0,r6
 2290 LDR      r1, freeheap
 2300 MOV      r0, #5
 2310 SWI      "OS_Heap"
 2320 MOV      r3, r7
 2330 B        extend1
 2340 .last
 2350 :
 2360 OPT pass ANDNOT 1
 2370 .brk1:MOVNV r0,r0
 2380 .brk2:MOVNV r0,r0
 2390 .brk3:MOVNV r0,r0
 2400 .brk4:MOVNV r0,r0
 2410 .brk5:MOVNV r0,r0
 2420 :
 2430 ]
 2440 NEXT pass
 2450 SYS "OS_File",10,"HeapCode",&FFC,,
mcode,last
 2460 :
 2470 CALL setupv,freespace%
 2480 quit%=FALSE
 2490 REPEAT
 2500 SYS "Wimp_SlotSize",-1,-1 TO size%
```

```
 2510 PRINT '"slot size currently ";~siz
e%
 2520 PRINT "select from..."
 2530 PRINT "1= fetch"'"2= return"'"3= e
xtend"'"4= memory"'"5= heap info"'"6= bl
ock info"'"7= quit"
 2540 g=GET-48
 2550 CASE g OF
 2560 WHEN 1
 2570 INPUT "size to fetch   "a$
 2580 IF a$<>"" THEN
 2590 a%=EVAL("&"+a$)
 2600 CALL fetchv,addr%,a%
 2610 PRINT"Returns node at &";~addr%
 2620 ENDIF
 2630 WHEN 2
 2640 INPUT "block to return "a$
 2650 IF a$<>"" THEN
 2660 a%=EVAL("&"+a$)
 2670 CALL returnv,a%
 2680 PRINT~a%;" returned"
 2690 ENDIF
 2700 WHEN 3
 2710 INPUT"extend which block "a$
 2720 INPUT"by how much "b$
 2730 IF a$<>"" THEN
 2740 a%=EVAL("&"+a$)
 2750 b%=EVAL("&"+b$)
 2760 CALL extendv,a%,b%
 2770 PRINT"block now at ";~a%
 2780 ENDIF
 2790 WHEN 4
 2800 a$="&3A000"
 2810 IF a$<>"" THEN
 2820 OSCLI("Memory "+a$)
 2830 ENDIF
 2840 WHEN 5
 2850 SYS "OS_Heap",1,!freeheap TO r0,r1
,r2,r3
 2860 PRINT"largest block is ";~r2;" byt
es out of ";~r3
 2870 WHEN 6
 2880 INPUT "info on which block "a$
 2890 IF a$<>"" THEN
 2900 a%=EVAL("&"+a$)
 2910 SYS "OS_Heap",6,!freeheap,a% TO r0
,r1,r2,r3
 2920 PRINT"block at ";~a%;" is ";~r3;"
bytes long"
 2930 ENDIF
 2940 WHEN 7: quit%=TRUE
 2950 ENDCASE
 2960 UNTIL quit%
 2970 END
```

PIPEDREAM 3



Car Lovers Annual Report on Company Fleet

	Value year ago	Value now	% inc	Cpcity	Cyls	Reg.
Porsche Carrera RSL	£50,000	£150,000	300.0%	2,700	6	RS 27
AC Cobra 289 Mk II	£90,000	£150,000	166.7%	4,700	8	289 COB
Jaguar D type	£375,000	£950,000	253.3%	3,800	6	D 1
Ferrari 250 SWB	£500,000	£1,100,000	220.0%	3,300	12	SWB 250
Ferrari 308 GTB	£35,000	£60,000	171.4%	3,000	8	GTB 308

Comment

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All trademarks acknowledged. The chart in the screen shown above was produced by sending numbers from PipeDream 3 to Lingenuity's Presenter 2 and then loading the resulting graph back into PipeDream 3.

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Into the Arc

Colours made easy

by Mike Williams

The Archimedes can be a very colourful machine, and yet if you want to start experimenting yourself with colour, things are not quite as simple as they seem. In this article in our series for newcomers to the Arc I want to explore some aspects of using colour, and that will mean a bit of programming in Basic. However, I'll try to keep everything fairly simple, so I hope you'll experiment for yourself as we go along.

Let's start off with some basic facts. In total the Archimedes is capable of generating a massive 4096 different shades of colour. Essentially, every colour is a mixture of the three primary colours of red, blue and green. There are 16 possible levels of red, 16 of blue and 16 of green giving a total combination of 16*16*16 which is the 4096 referred to earlier.

One way of verifying this is by using the Palette Manager on the icon bar. Click with Select on this icon and the palette window will be displayed showing the 16 Desktop colours, and three slider bars to control the amounts of red, blue and green in each colour. If you select one of the palette colours, you should find that with care you can move any of the three slider bars into any one of 16 positions ranging from 0% of that component up to 100%. However, whenever you are working with the Desktop it is definitely preferable to retain the default colours of the palette as the majority of Desktop applications have been designed to work with these colours.

Now although the Archimedes can reproduce all these 4096 shades, the range of colours which can be shown on the screen at any one time is rather more restricted. There are various reasons for this. Partly, the more colours there are, the more memory is needed to store the relevant information. The fact that the design of the Archimedes was intended to maintain a high degree of compatibility with the older BBC micro also confuses what might otherwise have been simpler.

We will avoid an exhaustive discussion of colour in all its aspects, and concentrate on the two main choices available to all users. As you will know, you can choose one of a number of screen modes for the screen display. In the main, for colour work, these can be divided into those like modes 12 and 20 which permit a maximum of 16 colours on the screen, and those like modes 15 and 21 which permit a maximum of 256 colours on the screen. Those modes which permit fewer than 16 colours partly exist to maintain BBC micro compatibility as mentioned, or to provide screen modes which require less memory.

16 COLOUR MODES

The 16 and 256 colour modes differ in the way in which colour is used and controlled so we'll deal with each separately, first of all the 16 colour modes. The 16 colours are numbered from 0 up to 15 - if you display the palette once again, clicking on each of the 16 colours in turn will show its corresponding number. Let's suppose you select the dark blue (using the default palette). This appears as colour 8, and consists of approximately one third green and about two thirds blue. However, if you use the slider bars you can change colour 8 to whatever you like (within the 4096 shades possible). So the shade associated with colour 8 is not fixed - it can be changed.

This is an important concept. In 16 colour modes, the colours are always referred to by numbers in the range 0 to 15, but the screen colour associated with each number can be changed. Moreover, change the colour of any number, and any parts of the screen display in that colour will change as well. For example, if you select the light blue in the palette (colour 15), and then use the slider bars to change this colour, you will see the original light blue of the Archimedes logo on the icon bar change in unison, though the effect is only apparent after the mouse button is released.

If you change the shade for colour 0 or colour 7 then a further effect becomes apparent. The intermediate shades will be changed as well to give a graduated range of colours from light to dark. This is built in to the way in which the Desktop Palette Manager operates.

Before proceeding further, let us save the default palette colours in a form which we can use from within a Basic program. Insert a suitable disc in drive 0, and open its directory viewer by clicking on the drive icon. Now click on the palette icon to open the palette window. Click the Menu button over the palette, select the Save option, and drag the palette sprite to the directory viewer. This will save the current palette settings as a file called *!Palette*.

Now let's see how we could use this in Basic. Press F12 to get the command line prompt, and then type:

```
Basic     <Return>
```

BBC Basic V will announce itself, and the Basic prompt (>) will appear. To remove what remains of the Desktop type:

```
MODE 12   <Return>
```

and the screen will go black, though remember that the Desktop is only in abeyance, not abandoned completely.

By default the screen background is in colour 0 (which is initially black). Any text or graphics will be in colour 7 (white). If you try selecting any other colour, for example colour 1, by typing:

```
COLOUR 1
```

you will find that all subsequent text is in red, and not the delicate shade of grey defined in the palette for colour 1. The default colours for mode 12 are given in the User Guide and are quite different from the Desktop's default palette.

However, we can turn the saved palette to our advantage. Type:

```
MODE 12
```

to restore the default mode 12 screen, followed by:

```
*!Palette
```

and the screen will change to white with a grey border, and with the text in black. What we have done is to load the previously saved palette, which redefines all 16 colours (numbered 0 to 15) as they were defined in the palette display. So colour 0 is now white, colour 7 is black. The palette also defines the screen border colour which is why that has changed to grey (note, this use of the palette is only effective as described - if you *exit* completely from the Desktop using Ctrl-Shift-F12 the palette is ineffective).

Thus, if you want to write a Basic program, one way of mixing the colours you want is to use the Palette Manager, adopting the default palette or moving the slider bars to create your own, and then saving the palette to disc. Executing *!Palette will then install the previously saved palette. You can use this in immediate mode, by typing the command in directly from the keyboard as above, or by including the line in a program. For example try the following short program:

```
 10 REM >Colour1
100 MODE 12
110 *!Palette
120 FOR C=1 TO 15
130 COLOUR C
140 PRINTTAB(30)"Colour ";C
150 NEXT C
160 END
```

We'll look at the details of this later. For now, if you run this program, it will list the colour numbers from 1 to 15 using the assigned colour for each (in other words we are reproducing the contents of the palette in another form). That only accounts for 15 out of the 16 colours of course. The 16th colour (colour 0) is already being used for the background colour of the screen, so it would be futile to display text in colour 0 on this background.

Now let's perform a cautionary experiment. We need to return to the Desktop, but first save the Basic program listed above by typing:

```
SAVE
```

This will save it with the name *Colour1* (to the currently selected directory). Provided that you left the Desktop by pressing F12 as described, then from within Basic, just type *QUIT and press Return twice - the Desktop should now be restored. Now using the Palette Manager as before create a new palette of colours which are different from the default ones and save this to disc. You don't have to call it !Palette - you can give it any name you like by editing the file name in the Save box, and thus save several different palettes on the same disc.

By this time the Desktop probably looks a rather queer combination of colours, so restore the normal Desktop by selecting the default palette from the palette menu. Now go back into Basic as I described before and reload the program using:

```
LOAD"Colour1"
```

Make sure that the line to load the palette refers to the modified palette which you have just saved, and not the original default palette (change line 110 as necessary). Now run the program which will perform as before, but with the new palette colours. Now quit from Basic and return to the Desktop, and (oh dear) the Desktop is still in those rather gruesome colours you chose to experiment with (however, if you redefine colours from within Basic without using the palette, then the Desktop palette colours remain unchanged).

Most Desktop applications are designed to look good using the default palette. One way of ensuring that when you return to the Desktop it looks right, is to save two palettes on your disc, one with the set of colours you want to use in your program, and the default palette. Then, as a last line in your program you can re-install the default palette before returning to the Desktop. For example, rewrite the program as follows:

```
 10 REM >Colour2
100 MODE 12
110 *MyPalette
120 FOR C=1 TO 15
130 COLOUR C
140 PRINTTAB(30)"Colour ";C
150 NEXT C
160 G=GET
170 CLS:*!Palette
180 END
```

This assumes that your own choice of colours is saved as *MyPalette* and that the default is saved as *!Palette*. I've also included an extra line (now line 160). This just pauses the program showing the display just created. Pressing any key then clears the screen, and immediately restores the default palette. Moreover, when you return to the Desktop, that too will be in its correct colours. In fact, you can achieve all this by simply double clicking on the icon for your program in the directory viewer. The screen display in your colours will be as before. Pressing any key will result in the standard message, "Press SPACE or click mouse to continue", and doing just that will restore the Desktop in its correct colours.

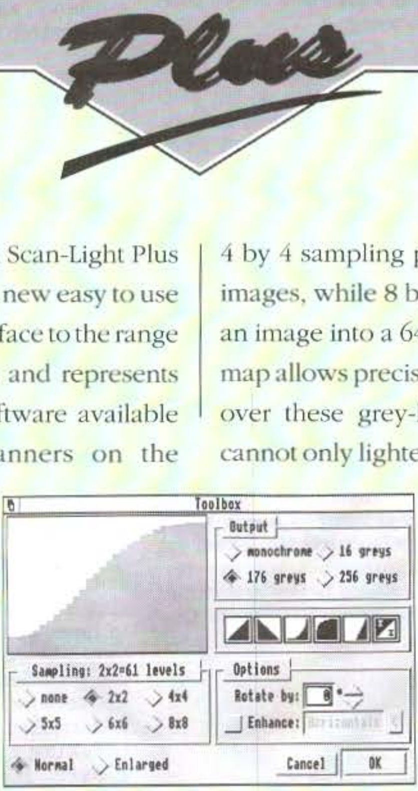
Now let's just have a quick look at what the program does. Most of it should be reasonably self-explanatory. After loading the palette, there is a FOR-NEXT loop which is executed once for each colour number from 1 to 15. The key to the use of colour is the COLOUR command. This simply selects a colour number in the range 1 to 15 and the following text is displayed in the colour associated with that number. This works for text; the GCOL command, used in the same way, works for graphics. In these short programs I have assumed that all programs and palette files are in the currently selected directory (probably the root directory $). If you use the idea in practice it is preferable to include the full pathname.

256 COLOUR MODES

These modes can be much more complex, so for now I want you to try a simple experiment using mode 15. Go back to Basic and modify our previous program to run in mode 15 instead of mode 12. Run the modified program. You will find that the colours displayed appear to bear no relationship to the defined palette. In fact, invoking a palette seems to make no difference at all. Now make a further change, modifying the loop to run from 1 to 63, not just 1 to 15. Run the program again and you will now get a much longer list showing 63 different shades. But what about the promised 256 colours? You can try changing the 63 in the loop to 255, but to no avail! The answer to that and other questions about the 256 colour modes must wait for a future article. You can of course read the manuals and work it all out for yourself - but that would spoil the fun wouldn't it?

SCAN LIGHT Plus

The latest generation Scan-Light Plus software provides a new easy to use and very powerful interface to the range of Scan-Light scanners and represents the most advanced software available for monochrome scanners on the Archimedes.



○ monochrome ○ 16 greys
● 176 greys ○ 256 greys

Sampling: 2x2=61 levels
○ none ● 2x2 ○ 4x4
○ 5x5 ○ 6x6 ○ 8x8

Rotate by: 0 °
☐ Enhance: Horizontals

● Normal ○ Enlarged

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Introducing C (Part 6)

by Dec McSweeney

As promised last month, here is a function to write a string to a file as if it had come from a Basic program. This is useful for "backwards compatibility" if you'll excuse the pun.

```
void write_bstring(FILE *out, char *str)
{
   int n;

   n=strlen(str);

   fputc('\0', out);
   fputc(n, out);

   str += --n;

   while( n-- >= 0 && !ferror(out))
      fputc(*(str--), out);

}
```

The function *strlen()* returns the number of characters in *str*. This is a standard function, found in *string.h*.

write_bstring is a void function but it really ought to report any errors. The nearest equivalent, *fputs()*, is of type *int* and returns EOF (a negative number) if an error occurs, otherwise it returns a non-negative value. To achieve this we could insert the following code before the closing brace:

```
   if(n == -1)     /** normal termination **/
      return(1);
   else
      return(EOF);
```

As before, the function type must be changed, this time to *int*. This function might be used thus:

```
/** Accept data from the screen and **/
/** write it to a Basic-like text file **/
/** another hand-thrown program from **/
/** the Dec McSweeney kiln, 1990 **/

#include <stdio.h>
#include <stdlib.h>
#include <string.h>
main()
{
   FILE *out;

   char bstring[256];
   int n;

   out=fopen("Bstrings", "w");

   if(!out){
      printf("can't open the file!\n");
      exit(-1);
   }

   do{
      printf("Enter a string: ");
      n = -1;
      do{
         bstring[++n] = getchar();
      }while(bstring[n] != '\n');
      bstring[n]='\0';
      if(n > 0)
         write_bstring(out, bstring);
      }while(n > 0);

   fclose(out);
   printf("Thank you and goodnight!");

}
```

Just a few points here. The body of the program comprises two nested "do..while" loops, the inner using *getchar()* to obtain input from the keyboard. Input terminates when the user enters Return ("\n") and a null character replaces the Return character. *n* is set to -1 at first, and incremented before each *getchar* so the 'while' tests the current character. This method is clearer than starting at 0, incrementing after the *getchar* and testing *bstring[n-1]*.

On exit, *n* is the length of the string excluding the Return character. If this is greater than zero, we write the string and repeat the operation, otherwise we exit the loop and the program. If you wanted to write a zero-length string with *write_bstring*, you would have to enter the null character followed by Return at the prompt (this can be done with Ctrl-@).

This is why the outer 'while' loop tests *n* rather than *strlen(bstring)*, which returns the number of characters up to the null - in this case 0. Note that *read_bstring* also copes well with zero-length strings.

The routines *read_bstring* and *write_bstring* contain almost everything needed to write corresponding routines for reading and writing integers in Basic format.

Basic integers are stored on disc as &40 followed by four bytes forming the number, high byte first. Thus the integer 16384238 (&FA00EE) would be stored as follows:

Byte	00	01	02	03	04
Value	40	00	FA	00	EE

Three C operations will be helpful in calculations. "&" is the bitwise AND (as opposed to "&&" the logical AND); ">>" is "shift right" and "<<" is "shift left". A shift to the left of n bits is equivalent to multiplication by 2 raised to the nth power, and a shift to the right is equivalent to a division; however, it is the programmer's job to ensure that nothing important drops off the end of the data.

The notation for hexadecimal numbers is 0Xn...n, e.g. 0XFA00EE for our example number. Thus:

```
n = 0XFA00EE;
m = (n & 0XFF) << 8; /* m now equals 0XEE00 */
p = n >> 16;         /* p now equals 0XFA   */
```

The following functions achieve the desired object:

```
/** Read BASIC-style integer from a file. **/
/** Assume that leading &40 has already **/
/** been discarded. **/

int read_basic_int(FILE *in)
{
   int n, ans;

   for(ans=n=0; n<4; n++)
      ans = (ans << 8) + fgetc(in);

   return(ans);
}

int write_basic_int(FILE *out, int output) {
   char x[4];
   int mask, n;

   for(n=3, mask=0XFF000000; n >= 0; n--, mask >>= 8)
      x[n]=(output & mask) >> (n * 8);

   fputc(0X40, out);
   for(n=3; n >= 0; n--)
      fputc(x[n], out);

   return(output);
}
```

The second function looks somewhat awkward but it does work. The first 'for' loop isolates each byte of the integer by masking out the rest of the variable and shifting what remains into the least significant byte, that is shift right by *n*8* bits. The table is filled "backward", the highest element first - this allows us to use n as both subscript and bit-shift counter. The second loop works backwards through the array, writing each byte to the file.

The *main* routine below reads each integer in a file, doubles it and writes it, again in Basic format, to a new file. Note how the call to *read_basic_int* is part of an expression which is an argument to *write_basic_int*.

The most complicated conversion is for "real" or floating-point numbers. These are stored in five bytes prefixed by &80. If you're interested you might like to try your hand at writing the code for *read_real* and *write_real*. Best of luck!

```
main()
{
   FILE *in, *out;

   in=fopen("$.basicnums", "r");
   out=fopen("$.cnums", "w");

   while(!feof(in)){
      c=fgetc(in);
      if(c == 0X40)
         write_basic_int(out, 2 * read_basic_int(in));
   }

fclose(in);
fclose(out);
}
```

INTRODUCING STRUCTURES

An important feature of most powerful programming languages, but sadly absent from Basic, is the facility to handle user-defined data structures. A structure is a collection of variables which relate to one another in some fashion. A classic example is the payroll record - name, hourly rate, tax code, etc. Each part of a structure can itself be a structure - the tax code consists of an *int* and a *char*, for example. The only restriction is that a structure cannot contain a structure of the same type, which makes sense when you think about it. C provides mechanisms for handling structures which enable you to handle large chunks of related data as a single entity.

First of all, the notation: to define a structure you simply list all the constituent parts in braces, like this:

```
struct example{
   char name[20];
   char address[4][30];
   int age;
   float height, weight;
   };
```

Note the semicolon following the closing brace. This is necessary because the braces form part of the *struct* declaration. When the compiler meets this, it does NOT reserve any space; it has simply been told about a new data type called *example* (in this instance). Later in the same program, you might define a variable thus:

```
struct example details;
```

This is the point when space is reserved for a variable called *details* of type *example*. *details* contains enough space for all the individual data items. To access these items, you must use an expression of the form:

```
details.age
```

The full stop is known as the "structure member operator". Here are some examples:

```
details.age = this_year - year_of_birth;
strcpy(details.name, "Peter Pan");
scanf("%s", details.address[i]);
```

In general, a structure member can be treated as a simple variable of the same type.

Structures are often used in arrays. The notation is a logical extension of the simple arrays we've already met:

```
struct example details[10];
/* defines 10 structures ([0] to [9]) */

details[n].age = days_old / 365;
scanf("%s", details[n].address[i]);
```

As you can see, the subscript follows the structure name, and is itself followed by the rest of the member name. A common cause of compilation errors is misplacement of subscripts in complex structures.

Naturally enough, you can also use pointers to access structures. This leads to some fun and games in the notation department:

```
struct example details[10], *ex;
/* define an array and a pointer */

ex = &details[n];
```

You can substitute *ex wherever *details[n]* can occur, but brackets are necessary here because the "structure member operator" (.) has a higher precedence than the "indirection operator" (*). The expression "*ex.weight" means "the pointer 'weight' within the structure 'ex'". Again, this is a rich source of programmer error, which is a shame because this is an immensely useful aspect of C.

To get round this a special operator, known as the "structure pointer operator" is used. In our example:

```
(*ex).weight
```

could be written as

```
ex->weight
```

The new operator is represented by a minus sign followed by a 'right angle bracket' or 'greater than' sign.

Naturally, you can have pointers within a structure, but what surprises many people is that a structure can contain pointers to the structure itself. One important application of this idea is in the "linked list". A simple illustration was used to build a line editor in the previous series on C in BEEBUG (5 parts starting in Vol.6 No.9). In essence, the structure had three components:

```
struct line_data{
   char *txt;
   /* char pointer to the text */
   struct line_data *prev;
   /* pointer to the previous line */
   struct line_data *next;
   /* pointer to the next line     */
};
```

Insertion and deletion are handled by linking and unlinking pointers. If *p* points to a line we wish to delete, the two instructions:

```
p->prev->next = p->next;
p->next->prev = p->prev;
```

achieve this (the first and last lines require slightly different treatment). It works because *p->prev* is a pointer to the *line_data* structure just as *p* is, so *p->prev->next* is "the pointer to the line after the previous one", which should be equal to *p* itself. The first line's *prev* would be set to NULL, as would the last line's next pointer; by definition, any pointer with a value of NULL doesn't point to anything (NULL, by the way, is a symbolic constant #defined in *stdio.h*). To present the data in order, we must know where the first line is:

```
struct line_data *first;
/* set and maintained during the program */
```

or we could search from the current position until we find the first line:

```
while(p->prev != NULL)
   p = p->prev;

p=first;
do{
   printf("%s\n", p->txt);
   p = p->next;
   }while(p != NULL);
```

This simple technique is used in many sophisticated word processors and editors. It can be adapted to maintain a sorted list by pointing to the next larger and next smaller items. The name/height/weight example above could be adapted as follows:

```
struct example{
   char name[20];
   char address[4][30];
   int age;
   float height, weight;
   struct example *older, *younger;
   };
```

As data is captured, its place in the list is found by recursive comparisons with *older->age* and *younger->age*. This leads to a tree structure which is discussed in detail in Kernighan and Ritchie's "The C Programming Language".

The next instalment in this series will take a further look at structures, and examine the formatted input/output functions, *printf()* and *scanf()* and their relatives.

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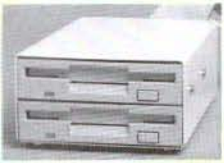

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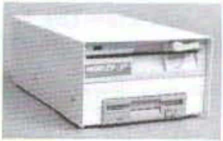

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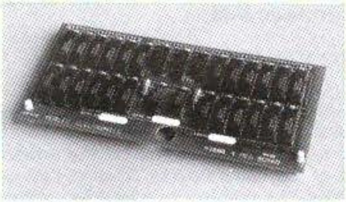

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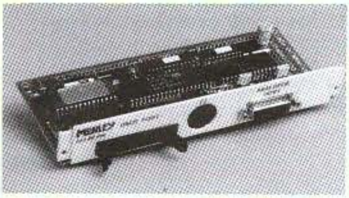

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Hints & Tips. . . Hints & Tips

PRINTING INTERNATIONAL CHARACTERS

Peter Bond

Using Impression in text mode recently, I was unable to get certain Spanish characters correctly printed using PrinterDM on my Epson-compatible printer. These characters had been inserted into the document using Alt and the numeric keypad. To be fair to Impression, the manual does warn that some such characters may not be printed correctly, but they should be!

The solution was to direct the output from PrinterDM to a file, then use Edit (with magic characters turned on) to replace the Escape sequence with another which called the IBM character set, including the correct hex characters for the letters I required. The file was then saved, and dragged to the printer driver icon.

The RISC User Volume 3 Special Disc now available includes an enhanced version of our popular TextPrint utility. This new version will correctly print, from a text file and in text mode (i.e. not using outline fonts), all characters which are common to both the Archimedes set and the Epson international set. This includes French, German, Spanish, Italian, Swedish and Japanese amongst others.

ACCURATE TIME

G. H. Toulmin

Neither the User Guide nor the BBC Basic Guide makes it clear that *Time and the Basic pseudo-function TIME$ use OS_Word 14,0 to take the time from the "soft copy" of the CMOS clock, updated following a hard reset, rather than from the clock itself. The PRM explains this (page 550) but does not point out that this soft copy is often a poor timekeeper. For example, mine gains about 2 seconds per hour, whereas the CMOS clock gains about 0.8 seconds per day. If you want an accurate time it is essential to use OS_Word 14,1, and the following function will achieve this. It also uses OS_Word 14,2 to convert the value into a string.

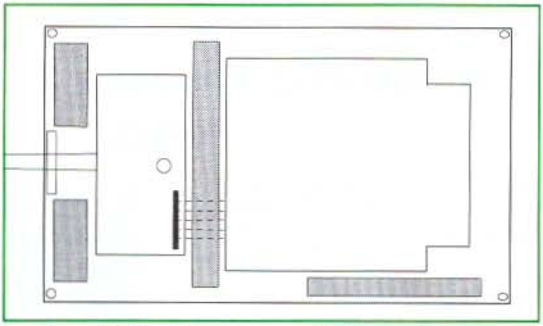
```
DEF FNtime
DIM blk% 26
blk%?1=1
SYS "OS_Word",14,blk%+1
?blk%=2
SYS "OS_Word",14,blk%
=$blk%
```

If the function is to be called more than once, the DIM should be placed at the start of the main program to avoid the storage being reserved more than once.

FATTEN UP YOUR MOUSE

Derek Lucas

The Archimedes mouse is light in weight, which means that when you take your hand away from it the pointer moves on the screen as a result of the cable flexing. This can often be a nuisance. The problem is solved by adding some lead weights to the mouse, which not only causes it to stay put on the mat, but improves the feel as you move it owing to the added inertia.



The middle of the mouse, with the lead weights shown in grey

Disconnect the mouse from the computer and remove the four screws underneath at the corners. Then add pieces of lead as shown in figure 1. I used cut portions of the wheel balancing weights which are distributed free by passing motorists! Wrap each piece in surgical tape to make it a snug fit and prevent any electrical contact with the circuit board. It is possible to add 75g of lead to the original weight of 90g.

Note that the diagram shows the inside of an older-style mouse. The design of newer mice is rather different, and you will need to work out the positioning of the lead weights for yourself.

MAESTRO PRINTOUTS REVISITED

Peter Williams

Following John Mitchell's hint on printing a music score, I have an alternative suggestion, for which you will need Paint, Draw and PrinterDM. Open Maestro to display a score.

Then from Paint's icon bar menu, select *Get screen area*. Drag the pointer across the visible part of the score and save the image as a sprite when prompted. Now open a Draw window and drag the saved sprite into it (alternatively you can drag the sprite icon from Paint's save box directly into the Draw window). Scroll the Maestro window and repeat the process until the whole score is in Draw. The file can then be printed from Draw. This method has the advantage that you can add text to the score, to provide a title for example.

QUIT AS A FUNCTION

Lee Calcraft

The Basic keyword QUIT is normally used to exit from Basic to the command line. However, QUIT is also a Basic function which returns the value TRUE or FALSE depending on the way in which the current program was run. If it was run with *<ProgName>, then QUIT returns TRUE. Otherwise it returns FALSE. This function is used by Basic to determine what should happen when the current program ends. If QUIT is TRUE, it will quit, and you will be left with the operating system prompt, otherwise you will stay in Basic.

To test this, use the one line program:

```
10 PRINT QUIT
```

Save it under the name of *Test*. Then run it from disc firstly with:

```
CHAIN "Test"
```

and secondly with

```
*Test
```

The first time around it will print zero, while the second time will produce -1.

HP DESKJET MANUAL FEED

John Ferguson

Readers who use an HP DeskJet Plus may be aware that when using PrinterLJ, selecting *manual* feed on the options menu appears to have no effect. This is because the printer driver sends a code sequence which is not recognised by the printer. However, by modifying a line in the printer driver's PrData file (*!PrinterLJ.PrData*), manual feed can be used to select the envelope path on the printer. First find the line in *PrData* which reads:

```
manual_feed:    <27>&l2H
```

and alter this to:

```
manual_feed:    <27>&l3H
```

Note that in each case, the character following the ampersand is a lower case L, *not* a figure 1. From now on, *manual* feed will feed envelopes or small sheets from the envelope feed path, while *auto feed* will take paper from the paper tray.

ESCAPE CORRUPTS SAVE

Barry Christie

If you are saving a Basic program, beware of the Escape key. Pressing it during a save will abort the operation, but at the same time it will leave a half-saved program on your disc, corrupting any previous version saved with the same name.

A USER ERROR NUMBER BLOCK

Lee Calcraft

At RISC User's request, Acorn has issued a block of error numbers for 'User' use. The block consists of the 256 error numbers in the range:

```
&007FFF00 to &007FFFFF
```

These would typically be used in statements such as:

```
ERROR &7FFF01,"File too long to load"
```

By assigning a unique number to such an error, a program's error handler can react to it in a manner dependent on the error type.

ERROR NUMBER ZERO

Lee Calcraft

By assigning an error number of zero, you can give special status to an error. It becomes a 'fatal' error, and your program will react violently to it, stopping immediately without passing through any error handlers you may have set up. As an example, the following line would generate a fatal error:

```
IF a%=0 THEN ERROR 0,"This program is
fatally flawed"
```

The 'Address exception' and 'Abort on data transfer' errors work in this way, and cannot be trapped by normal means.

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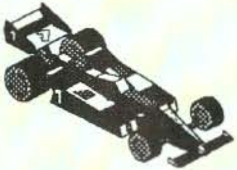

Ace Computing

Postbag

A QUESTION OF COPYRIGHT

I read your editorial in the September issue of RISC User (Volume 3 Issue 9) about copyright. Most of the software published in magazines cannot possibly be sold, so what is the problem about it becoming public domain, provided that full acknowledgement is made of the source? There would of course have to be a few months delay to allow all people to buy the magazine who wish to. I would have thought the main reason for publishing programs in the magazine is to ***sell*** *the magazine. The wider the distribution of routines and short programs the more likely we are to get decent programs which we can buy.*

Barry Allen

Ted Kirk in a further letter adds:

It does seem to me that a program published in full in a magazine and demonstrating an excellent implementation of a task ***is*** *then morally in the public domain.*

We believe that the ready availability of public domain (PD) software for the Archimedes is certainly indicative of thriving user interest in the machines in question, and we would wish to support and encourage that development (witness the launch of the BEEBUG PD Software Library). However, public domain software is normally distributed for no more than a nominal handling charge, with little testing or support by the distributors for any PD programs.

On the other hand, our magazine programs are thoroughly tested and often modified or extended to ensure that they are easy to use as well. Also, many programs are developed in house to professional standards. We are also prepared to deal with any problems or queries which subsequently may arise. With so much time and effort (and thus money) put into our programs, we feel quite justified in keeping the copyright and making a charge for RISC User magazine discs. After all, would readers be happy to see programs which they have paid for (by their subscriptions) being made freely available to non-members for next to nothing.

Whatever your own views, readers should be aware of the 1988 Copyright, Designs and Patents Act, the provisions of which came into force on 1st August 1989. This act gives specific copyright protection to all computer programs (unless copyright is clearly waived by the copyright holder). Thus copying any program is against the law unless permission has been given.

Certainly it is the case, that once a program has been published in a magazine then it is readily available to all who have access to that publication, but no one other than the copyright holder has the right to distribute copies whether for money or for free without permission (prior permission to distribute any RISC User programs should be sought from the editor).

ADVENTURER NEEDS HELP

Arcade is a feature I normally do little more than skim through, but in Volume 3 Issue 9 I see that Magnetic Scrolls adventures are mentioned. ***!Fish*** *and* ***Corruption*** *are indeed excellent games as are* ***The Pawn*** *and* ***Guild of Thieves****, and I wonder if Peter Rochford has worked through these two. Having purchased both several weeks ago I discovered that the former caused a fatal error towards the end of a long but interesting trail. In sheer exasperation I wiped* ***The Pawn*** *from my hard disc and destroyed the floppy! Regarding* ***Guild of Thieves*** *the only problem is that I cannot finish it, even with the assistance of the disc-based hints. Can anyone tell me how, after crossing the hot coals, the four dice should be inserted in the correct slots so that the third (opaque) case may be opened? I would judge that this lies more than two-thirds of the way through the adventure and I hate leaving it unfinished.*

H.P.Craig

Peter Rochford, in reply, says he has not encountered or heard of any fatal bug in *The Pawn*. However, he has yet to bring either game to a conclusion, and any help from other readers would be welcome. Unfortunately, Magnetic Scrolls no longer exists, and so although the games are still available (via a company which has purchased the distribution rights), there is no longer the possibility of any support or back-up for the games themselves.

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WANTED: Advanced/Pres 256K AQR RAM cartridge. Tel. 031-449 6598.

Archimedes A310, RISC OS, 4-slot backplane, manuals and lots of software. £500. Tel. 081-673 7984 (answerphone)

Epson LX800 printer & 3 ribbons. Excellent condition, £150. Casio CZ101 MIDI compatible synthesizer/Acorn MIDI interface/MIDI books & cables, £220 ono. Tel. (0908) 614495 eves.

Technical Queries

APPLICATION DIRECTORIES AND OBEY FILES

The following enquiry is typical of a number which we receive by letter and by phone (and indeed in person at the October Open Day) concerning the use of application directories and Obey files.

> ***Dear Sir,***
>
> ***I am writing to you with reference to an item entitled 'More PC Emulator Memory' in your Hints & Tips pages for RISC User Volume 3 Issue 10. I have the PC Emulator version 1.34 and would like to know the form of the Obey file to load the emulator with the extra memory capability and how to set this up for use.***
>
> ***R.D.Gibbons***

From discussions it is apparent that a good many readers are still unsure of the nature and use of application directories, and the files which such directories will normally contain. We will therefore devote some space here to put the relevant details on record for future reference, using the query regarding the PC Emulator hint as an example where appropriate.

An application directory is like any other directory in that it is designed to contain other files and directories, and is not a file itself. However, an application directory serves a particular purpose. It acts as an 'umbrella' for initiating and running an application, and this action is achieved by double clicking on an application icon.

An application directory can be created as with any directory by opening the directory viewer within which the application directory is to be situated (this could be simply the root directory of a disc by clicking on the disc drive icon bar icon). Once visible, click the Menu button over the directory viewer and select *New Directory*. Slide the pointer to the right and enter (or edit) the name for your new directory. The only thing that determines that an application directory will be created is that the directory name should begin with a '!' character. Thus for use in setting up the PC Emulator we might create a directory called !PCSetUp. An application directory is given a different icon from that for an ordinary directory, and users can design their own icons as well (see later).

At any time you can look inside an application directory by double clicking on its icon *while holding down the Shift key*. As a minimum, an application directory needs to contain an Obey file called !Run which is run when the user double clicks on the application icon. !Run files are often quite short. An application directory will, in most cases, contain a further file called !RunImage. This is the program which is to be run. Other files which you may find in any application directory include !Boot (to specify any actions when the directory viewer containing the application directory is first opened), !Sprites (which contains one or more sprites to use as icons), and !Templates which contains window templates for Wimp applications.

To create a !Run file you need to install the Edit application from Applications disc 1. Then click with the Menu button on its icon bar icon, and select *Create* and then *New Obey file*. A window will open and you should then type in the details given for the !Run file (as in the PC hint referred to). Click with the Menu button over this window and select the *Save* option. Make sure that the name for this is just *!Run* and then drag the file icon into the application directory for which it is intended.

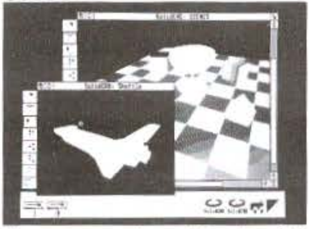
If required, a !Boot file can be created in exactly the same way. To create an alternative sprite for use as an icon for the application directory, you will need to install and use the Paint application (also from Applications disc 1) and create a sprite 34 by 17 pixels giving it the same name as the application (e.g. !PCSetUp in the example), and saving it in a file called !Sprites. This sprite will then be used as the application's icon when the directory viewer containing it is first opened.

And that's all there is to it. In the case of the PC hint it might be desirable to include the PC Emulator itself within the application directory and ensure the correct directory for this is specified in the !Run file. Much of this information is contained in the pages of the User Guide. More specific articles on this topic have appeared in RISC User Volume 2 Issues 4 & 10, and Volume 3 Issues 2, 5, & 10. RU

SILICON VISION

DESKTOP SOLUTIONS FOR THE ARCHIMEDES & BBC A3000

SOLIDCAD



The next generation multi-tasking CAD package combining 2D Draughting and 3D Modelling techniques with advanced smooth shading and lighting effects to provide the ultimate 3D Draughting System for Architectural design, Interior design, Engineering design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D to visualise a model while it is being created. Powerful zoom, pan, sweep, extrude and macro facilities are also provided to enhance design productivity. The package is unique in its ability to generate the fastest 3D design displays and most comprehensive rendering styles including instant smooth shading with multiple light sources and ambient lighting effects.

PRESS COMMENTS

"It is almost certain to do everything you want. This is a comfortable environment, uncluttered and easy to use. Don't hesitate to buy it" - Micronet June 1989

MAIN FEATURES

- Surface definition for Solid Objects - Multiple Light sources using smooth shading techniques with ambient lighting effects - Zoom & Pan for precision drawing - Select, Cut, Copy & Paste operations - Dynamic Scene & Viewpoint - Supports 1st and 3rd Angle Projections - Epson compatible and Integrex colour printer drivers as standard - Interactive Sweep & Extrude for Surfaces of Revolution & Extrusion - Mouse driven user interface - Interactive Macros for Building Block Design of complex objects - Distance & Angular measurements - Comprehensive display styles include Wireframe, Convex outline, Convex fill, Concave sort, Scan-Line for intersecting surfaces and Smooth Shading with lights - Image transfer to ART or DTP packages - Data entry for Scientific displays or importing external designs

(RISC OS) New

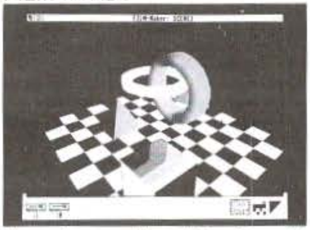
REALTIME SOLIDS MODELLER

The package includes both the sophisticated design environment of SolidCAD and the high speed capability of a Realtime Graphics Language module to provide the fastest programmable animation facilities bringing any design to life from within your own programs. Facilities include 3D Rotate, Scale, Orbit, Perspective, Position & extensive display styles for wireframes, hidden-surface removal, smooth shading and multiple light sources with individual intensities.

"Realtime Solids Modeller should have many applications in schools as well as industry, and even at home it has a great deal to offer in terms of creating images purely for pleasure. It is very easy to use and extremely well documented if you get stuck" - Micro User July 1989

(RISC OS) New

FILM-MAKER



The package provides an interactive multi-tasking environment to create animated sequences of 3D scenes with dynamic camera motion for 'walk-throughs' and 'flight-paths' for objects within the scene. The fully graphical environment requires no programming or textual entry and the capability to calculate smooth shaded frames of complex scenes with lighting effects at very high speeds allows fast interactive design of animated sequences. Large numbers of these frames are then stored in a compressed format to play back at flicker-free rates for on-screen animation or video recording. Fully compatible with SolidCAD for design data & SolidsRENDER for ray tracing, animation Oscars are now within your reach.

PRESS COMMENTS

"Animation Oscars are up for grabs with Silicon Vision's FILM-Maker. The user interface & excellent manual make the program suitable for novice computer users. FILM-Maker will thrill the graphics enthusiast and provide infinite layers of investigation for the student of art, design or computer studies." - A&B Computing August 1989

"Specifying the movements of objects is a dream"
- Acorn User October 1989

"FILM-Maker greatly extends the usefulness of the 3D scenes or objects created by SolidCAD or the Realtime Solids Modeller ... allowing you to experiment with three dimensional animation" - Micro User August 1989

"It is a delight to use, has an excellent manual and can produce more than pleasing results in a very short time as well as allowing quite sophisticated & extended ones. Full marks to Silicon Vision!" - Micronet July 1989

(RISC OS) New

SUPERDUMP

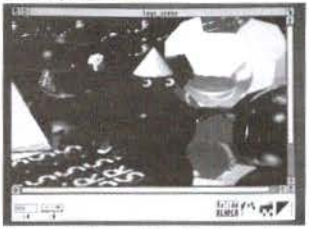
The ultimate printer driver which takes advantage of the highest resolution capability of ordinary Epson compatible 24-pin & 9-pin printers to provide 1920x1024 resolution which is equivalent to 240 dots/inch for near laser quality hardcopy. Fully compatible with SolidCAD, Realtime Solids Modeller, Gate Array Design packages & any other program capable of creating VDU plotfiles.

PRESS COMMENT

"Super-Dump effectively turns your ordinary dot matrix printer into a plotter ..... a marvellous piece of software. At last you can produce graphics printouts which genuinely look like their screen equivalents." - Beebug May 1988

(RISC OS) New

SOLIDSRENDER



The most advanced Ray Tracing package for the Archimedes producing photo-realistic images of SolidCAD designs or FILM-Maker animations taking into account multiple light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence. The high-speed ray tracer uses sophisticated colour mixing techniques to provide the maximum range of colour shades plus anti-aliasing for smooth edges, motion blur effects, dynamic viewpoint, variable camera lens for wide angle and telephoto effects and multi-colour light sources driving the Archimedes display hardware to its limits for the best photo-realistic images within the laws of optical physics.

It is the ideal companion to Silicon Vision's SolidCAD and Realtime Solids Modeller packages which allow interactive design of 3D scenes. The 3D scenes produced by these design systems can be ray-traced directly with the SolidsRENDER package and the results used in Art or Desktop Publishing packages. SolidsRENDER is capable of producing full screen images faster than any other package in the market allowing quick changes to be made without the prolonged regeneration time of most conventional ray tracers. This allows many more ray-traced frames to be generated for animation in the same amount of time. In addition, Silicon Vision is unique in providing an integrated range of packages for (i) 3D CAD, (ii) Programmable 3D Animation, (iii) Interactive 3D Animation and (iv) Ray Tracing. As Europe's fastest growing Software House, you'll find no better company to do business with.

"SolidsRENDER offers the most comprehensive and advanced object properties ... the fastest ray-tracer — outputting the highest quality images"
- A&B Computing 1990.

(RISC OS) New

SUPERPLOT

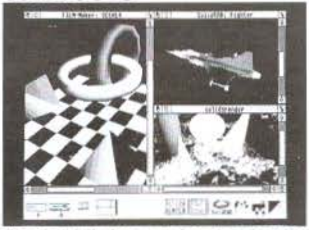
The complete plotter driver for SolidCAD, Realtime Solids Modeller and Gate-Array Design System supporting the industry standard HP-GL, Graphtec, Watanabe and Plotmate plotters.

(RISC OS) New

SILICON VISION

DESKTOP SOLUTIONS FOR THE ARCHIMEDES & BBC A3000

SOLIDTOOLS

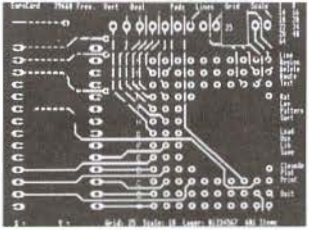


The first fully integrated environment for 3D CAD, Photo-realistic rendering, Interactive animation, Programmable animation and high resolution hardcopy to printers and plotters taking designers to new heights of design productivity and performance exceeding the capabilities of 'heavy-weight' packages on PC-compatibles and workstations which cost considerably more. The software provides 3D CAD facilities for Architectural, Engineering and Interior design and adopts the industry standard 1st & 3rd angle projection technique for drawing simultaneously in plan, front and side elevations together with a 3D projection to view the design from any angle. A unique smooth shading facility is also provided for instant high quality rendering of the design for improved presentation. An interactive 3D animation facility also allows flight-paths for cameras and objects to be drawn to create 'fly-through' effects for animated sequences to further improve presentations or to analyse the ergonomics and aesthetic qualities of the design. The system also boasts breath-taking photo-realistic capability using advanced ray-tracing techniques with object orientated design facilities pushing the Archimedes colour display hardware to its limits for reflections, transparencies, shadows, and textures. Extensive hardcopy facilities are also provided to output designs to printers and all industry standard plotters at maximum resolution for high quality CAD drawings. The powerful RISC OS multi-tasking capability also allows greater integration with other related applications such as DTP and ART software so that 3D shaded images may be included in other documents for professional presentation. An 'open architecture' approach also allows the importing of externally generated designs and programming facilities allow access to the high performance 3D display functions of the package for further customisation if required. The package includes SolidCAD, FILM-Maker, SolidsRENDER, Realtime Graphics Language, SuperDump & SuperPlot for a turnkey solution satisfying all your conceptual design and presentation requirements.

"Puts Silicon Vision at the top of the CAD market" - A&B Computing 1990.

(RISC OS) New

ARC-PCB PROFESSIONAL



The ultimate PCB design package developed specifically for the Archimedes is now even better. ARC-PCB Professional follows on the success of the original and provides Faster & Improved Automatic Routing, Oval & Circular pads with fully variable sizes, Faster Redraw, Extended library part manipulation, & Instant Editing operations for substantially increased productivity. This Professional version operates orders of magnitude faster than the original and surpasses all other PC-based PCB design systems in features & speed of operation for the fastest turnaround from concept to finished board design. Take the lead for your PCB designs before your competitors do.

(RISC OS) New

ARC-PCB

The original PCB design package developed specifically for the Archimedes with a specification that cannot be matched by any PC-based system.

ARC-PCB provides a complete solution for the general requirements of high performance digital electronic board designs. Features include Automatic routing, Rats-nesting, Multiple-layers, Circular & Surface mount Pads, 0.001" resolution, 32"x32" maximum board size, On-line Help, Fast Zoom/Pan/Redraw, Text & Silkscreen facility, Variable Track/Pad/Text/Grid sizes, Hierarchical Part Libraries, Block Move/Copy/Rotate/Mirror/Erase options, Component Pulling, Clear pad holes, Drilling data, and up to 300,000 components. Also supports industry standard HP-GL, GRAPHTEC, PLOTMATE plotters and printers at their highest resolutions for high quality PCB artwork.

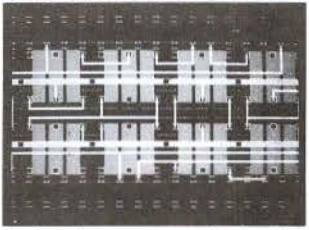
PRESS COMMENTS

"ARC-PCB provides much of the functionality of the 'heavy-weight' PCB layout packages which run on the IBM-PC and compatibles and are much more expensive" - A&B Computing Dec 1988

"Performs up to professional standards. Most comprehensive available on any micro" - BBC Acorn User February 1989

(RISC OS) New

GATE ARRAY DESIGN SYSTEM



An introductory course for teaching Silicon Chip Design with facilities for Array design, Cell design, On-line Help and a tutorial on integrated circuit design. Ideal as a low cost teaching tool for engineers & students where expensive silicon fabrication facilities are not required.

MAIN FEATURES

- *Symbolic Cell Design for functional low level circuitry*
- *Array Design for complete chip layout and interconnection*
- *On-line Help facilities on every aspect of the system*
- *Step-by-step tutorial on chip design with examples*
- *Extensive editing facilities*
- *Supports Super-Dump for hardcopy*

(RISC OS) New

GERBERPLOT

The complete Gerber driver for ARC-PCB and ARC-PCB Professional Printed Circuit Board design packages producing industry standard Gerber plotfiles for driving Electrostatic Photo-plotters. These plotfiles may be sent directly to photoplotter bureaus on Archimedes ADFS or MSDOS disc formats to produce the highest quality PCB artwork for professional results.

For bureaus requiring MSDOS format discs, you will require the Acorn PC-Emulator software package for transferring Gerber plotfiles from the Archimedes ADFS to MSDOS format.

(RISC OS) New

3D Graphics Development System

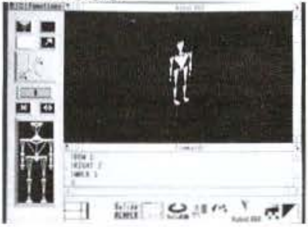
A complete 3D Wireframe design and animation system, originally written for the BBC B/Master 128, is now available for the Archimedes running under the 6502 Emulator. Takes advantage of the Archimedes screen and colour modes and is ideal as a low cost introduction to the world of 3D Graphics to teach 3D Vector principles and Solids of revolution where display speed is not critical.

(6502 Emulator) New

SILICON VISION

DESKTOP SOLUTIONS FOR THE ARCHIMEDES & BBC A3000

RoboLOGO



This new extension to traditional LOGO, made possible only by the enormous computational power of the Archimedes, provides three dimensional control of an articulated humanoid or animal figure through the use of a standard LOGO language. Sophisticated natural commands such as 'Walking', 'Turning', 'Bowing', and 'Picking', etc are automatically represented graphically by natural movements of the 3D figure. This natural form of graphical response is readily understood by students using LOGO to learn the concepts of logic & reasoning. The traditional Turtlegraphics & 3D Glider features are also supported for easy transition to this innovative concept in natural response LOGO.

The 'humanoid' can be transformed into any animal like figure by simple restructuring of body segments and hinge points as required.

Extensive natural control operations are provided as standard, however new body movements can be constructed either with a built-in graphical editor to define new movement sequences or by using commands within the LOGO language to create new movement procedures.

The package takes advantage of the Archimedes computing power to provide dynamic articulation of complex 3D figures in a user-friendly interface not previously possible.

This allows students to apply natural real-life movements to a 3D figure and appreciate the results in realtime.

MAIN FEATURES

- *Each body segment may be rotated about hinges or scaled in 3D*
- *The users viewpoint may be altered dynamically*
- *Turtlegraphics & 3D Glider included*
- *Uses mouse driven Window facilities*
- *Create complex movements using combinations of primitive operations*
- *Movement editor allows play-back and editing of sequences*
- *LOGO programming language providing sophisticated movement of natural animal-like figures.*

(RISC OS) New

RiscBASIC

The best BASIC V compiler money can buy. Here's what the reviewers say:

"If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC"
- RISC USER August 1989.

"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. This will be an invaluable addition to every serious BASIC programmer's toolkit. My congratulations to Silicon Vision" - Archive June 1989.

"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

"RiscBASIC wins the race...has the edge overall...more likely to provide the correct results" - BBC Acorn User Nov 1989.

"Still the only true BASIC V syntax compiler. If you want the best, buy Silicon Vision's complete answer"
- Micronet August 1989.

"This is an excellent product, well supported" - A&B Computing April 1990.

Features include an optimising compiler for speed & memory efficient code, relocatable modules with multiple star commands, full cross references, Window-based or command line compilation environment, standalone code generation, in-line assembler with powerful floating point mnemonic extensions, full RISC OS support, and comprehensive compiler directives from a leading Software House renowned for technical excellence that makes RiscBASIC the best BASIC V compiler money can buy.

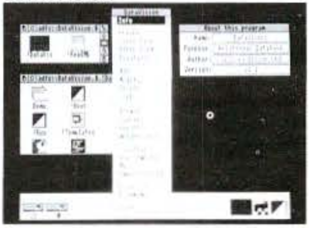
(RISC OS) New

RiscFORTH

A new 32-bit implementation of the FORTH-83 standard, designed to take full advantage of the ARM architecture. The language is ideal for process control applications including robotics, interfacing and realtime applications providing a comprehensive programming environment with built-in Editors, Assemblers, WIMP support and Standalone code generation.

(RISC OS) New

DataVision



A full featured true relational database management system which also includes word processing, label printing, reporting, & mail-merging facilities in one integrated environment for the Archimedes, bringing professional quality business software to the demanding user. The database manager is rich in features and includes facilities for the production of complex queries, detailed reports, browsing, sophisticated relational data entry, relational reporting, interactive & global editing, formula entry and validation. All this in an intuitive easy to use mouse driven environment.

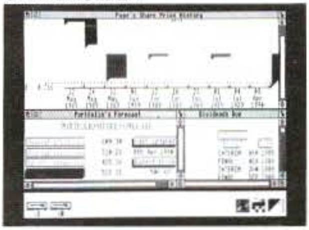
Capacity: Unlimited records per file, 999 fields per record, 9 field types (date, time, alphanumeric, multiple-choice, capitals, logical yes no, integer, reals and formula), 255 characters alphanumeric field, and up to 100 related files per field.
Viewing Files: Uses 'Video-style' icons (next, previous, rewind,etc) to control the display of individual single or multi-page records or displays up to 20 records at a time in a spreadsheet format.
Data Entry: True relational data entry allowing lookups and transfers between files. Validations (range checks, required values, default values, and automatic date time checks), selective and global modification, and powerful automatic field entry using formulae based on other fields and functions.
Restructuring: Fields may be added deleted, renamed or repositioned at any time with automatic restructuring of existing files containing data.
Queries: The query system allows multiple parameters to be defined in one search, linked using AND OR logic together with any operator (<, <=, >, >=, <>, =) or use simple direct menu-driven search parameters to quickly find the required records. Queries may also be saved for later use.
Reports: These are designed interactively and may contain up to 20 columns, each column having summaries attached such as totals and averages and may be grouped for sorted files. Label generation allows printing of up to 5 labels across.
Mail-Merge: A wordprocessor allows powerful text editing and database field references for free-form and selective mail-merging. Includes import export facilities.

(RISC OS) New

SILICON VISION

DESKTOP SOLUTIONS FOR THE ARCHIMEDES & BBC A3000/B/B+/M128

SHAREHOLDER



The complete share holder's management system providing all the facilities needed to automate your portfolio. Features include Company statistics, Share holdings, Transaction processing, Portfolio history, Forecasts, Dividends due, Share price updates plus built-in Calendar, Calculator and Hardcopy facilities for total integration.

MAIN FEATURES

Transactions: Holds transaction dates, shares holding for shares bought or sold, price per share, costs (broker charges, etc), each transaction value, total shares held and total transaction values.
Dividends: Holds information on the last three tax years for interim dividends, final dividends, total dividends, tax credits and tax rates.
Statistics: Holds information on the latest share prices and calculates the latest total values, gains and average net yield. Share history and forcasts are also displayed.
Portfolio: Facilities are also included for total portfolio value, dividend lists, portfolio history/forcast and total dividends due.

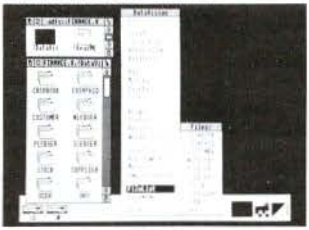
(RISC OS) New

PRESENTATION SYSTEM

An interactive environment to create, edit and play-back computer controlled presentations for demonstrations and lectures. The contents of the presentation can range from textual to graphical displays consisting of lines, rectangles, triangles, circles, arcs, ellipses and sectors plus user definable graph plotting. Features include Subtitling and Pointers for hints, continuous playback mode, Back & Forward Paging facility and controlling external programs during presentations. Suitable for use on ordinary TV screens.

(RISC OS) New

FINANCIAL ACCOUNTANT



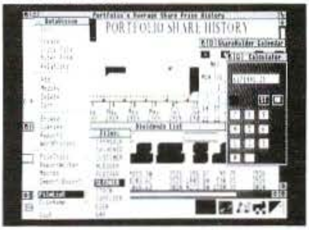
The professional business accounting and database package which includes DATAVISION together with turnkey applications for Order Processing, Invoicing, Sales ledger, Purchase ledger, Nominal ledger, Cash book, Stock management, Reporting and VAT analysis complete in one integrated environment.

MAIN FEATURES

Customers/Suppliers: Holds information on all the customer/supplier codes, names, addresses, telephone, fax and telex numbers, credit limits, account balances, turnover and contact names.
Stock: Holds information on stock codes, description, unit parts, cost price, selling price, minimum, maximum and reorder stock levels, quantity on hand, numbers sold to date, total sales costs and revenue and individual VAT codes.
Vat: Holds all the VAT codes used by the ledgers together with VAT rates, total sales goods value and output tax to date together with purchase goods value and input tax to date for each different VAT rate to aid analysis for period VAT returns.
Sales Ledger: Provides facilities for automatic tax point, order number, customer code, stock code, quantity sold, due date for credit, amount paid and paid date. The system automatically creates fields for stock description, cost price, selling price, VAT rate and value, Invoice value, goods value, and cost value.
Purchase Ledger: Provides facilities for automatic purchase date, purchase order number, Invoice number, supplier code, stock code, quantity bought, due date, and amount paid. The system automatically creates fields for the VAT code, VAT rate, cost price, goods, VAT & invoice values.
Cashbook/Paid: Allows transactions of receipts from customers and payments to suppliers and holds information on customer/supplier codes, item references, amounts, dates and nominal codes.
Nominal Ledger: Automatically maintains a creditors and a debtors control account.

(RISC OS) New

OFFICETOOLS



The complete Office Automation system for Database management, Mail merging, Wordprocessing, Label printing, Order Processing, Invoicing, Accounting, Share portfolio, Forecasting, Dividends processing, Calendar, Calculator and Business Presentation. Includes Financial Accountant, DataVision, ShareHolder, and the Presentation System providing a turnkey solution for all your business and management requirements.

MAIN FEATURES

Database: True relational database management providing both relational data-entry and reporting facilities with integrated wordprocessing, mailmerging and label printing. Accounting: Fully integrated accounting system to automate your business transactions. Share Portfolio: A complete share portfolio management system for the small investor. Presentation: Computer controlled lectures and demonstrations for effective visual impact.

(RISC OS) New

SOLIDCAD

A design package for drawing in front, plan & side elevations to create solid objects which may be viewed from any angle.

(BBC B/B+/Master 128) New

REALTIME GRAPHICS LANGUAGE

The complete 3D Animation system for creating flicker-free sequences of 3D objects from your own programs. Fully compatible with SolidCAD for designs.

(BBC B/B+/Master 128) New

Other software include BBC B/B+/M128 versions of 3D Graphics Development System, Presentation System, Gate Array Design System, SuperDump & SuperPlot.

All RISC OS software run in native mode on A300-400 Series & BBC A3000.

SILICON VISION LTD, SIGNAL HOUSE, LYON ROAD, HARROW
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Middle East	£29.00	£43.00
Americas & Africa	£31.00	£46.00
Elsewhere	£34.00	£51.00

All subscriptions, including overseas, should be in pounds sterling. We will also accept payment by Connect, Access and Visa, and official UK orders are welcome.

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We intend to maintain stocks of back issues. New subscribers can therefore obtain earlier copies to provide a complete set from Vol.1 Issue 1. Back issues cost £1.20 each (£1.60 for Volume 3.) You should also include postage as shown:

Post and Packing	**UK, BFPO, Ch.Is**	**Europe plus Eire**	**Elsewhere**
First Issue	60p	£1.00	£2.00
Each subsequent Issue	30p	50p	£1.00

MAGAZINE DISC

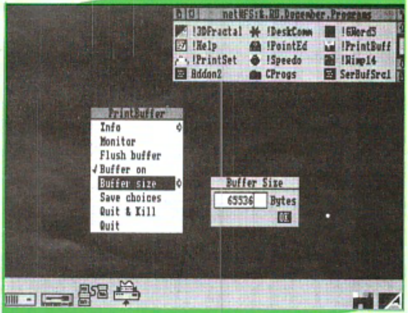
The programs from each issue of RISC User, together with a number of additional items, are included on a monthly 3.5" disc. This will be available to order, or you may take out a subscription to ensure that the disc arrives at the same time as the magazine.

Disc Subscription Rates	**UK**	**Overseas**
Single issue discs	£4.75	£4.75
Six months subscription	£25.00	£30.00
Twelve months subscription	£50.00	£56.00

Disc subscriptions include postage, but you should add the appropriate rate (see above) per disc for individual orders.

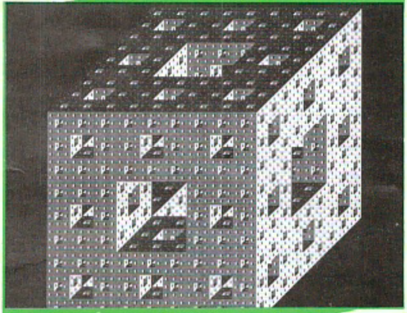
RISC User & BEEBUG, 117 Hatfield Road, St Albans, Herts AL1 4JS.
Tel: St Albans (0727) 40303   Fax: (0727) 860263

RISC USER MAGAZINE DISC CONTENTS

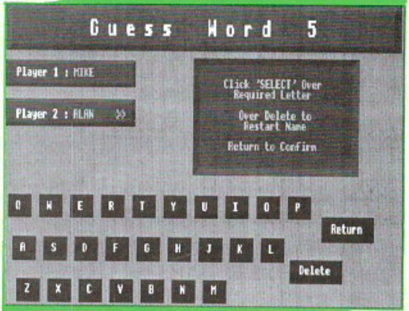


Buffer Size: 65536 Bytes

A Printer and Serial Buffer for the Arc



Three Dimensional Fractals



Player 1 : MIKE

Player 2 : ALAN >>

Click 'SELECT' Over Required Letter

Over Delete to Restart Name

Return to Confirm

GuessWord 5

PROGRAMS IN RISC USER DECEMBER 1990

A Printer and Serial Buffer for the Arc

An enhanced version of the variable sized printer buffer, published in RISC User Vol.1 No.3, which can be configured also as a serial buffer.

Desktop Command Controller

A multi-tasking utility, which allows you to run operating system commands from the Desktop, i.e. select different sets of function key definitions, install modules and applications, or open directory windows with a single button press.

A Vector Listing Utility

A short utility which provides a list of all current vectors and the routines attached to them.

Three Dimensional Fractals

A fascinating and experimental 3D fractal in the form of a rectangular block with incised rectangular holes.

A Printer Set-Up Utility (Part 2)

The complete non-Wimp program with the added facility to select printer functions and send the codes to the printer.

Mastering the Wimp (Implementing a Drag-Save)

The extended Wimp testbed program, which concludes the subject of implementing a Save box.

Assembler Workshop (A Contracting Heap Manager)

A fully commented listing demonstrating the heap manager from this month's Workshop.

Introducing 'C' (Part 6)

Two functions to read and write Basic-style integers and a short file Bstrings, containing strings written by a Basic program.

ADDITIONAL PROGRAMS DESCRIBED IN THE MAGAZINE

GuessWord 5

An entertaining and challenging family game, Guessword 5 is a version of the board game Mastermind, in which you must guess at a five-letter word.

BONUS ITEMS

Printer Buffer Controller

A Wimp front end for the Printer Buffer from this month.

Wimp Speedometer

This utility complements the Wimp message monitor and continually displays the speed at which the Wimp is running.

Pointer Definer

Define different shaped pointers with this utility.

European Balls Demo

Superb animation with a Euro theme.

ArcScan Data

The ArcScan data files for this issue of RISC User and BEEBUG Vol.9 No.6.

Special Offers to RISC User Members - Dec 1990

Each month RISC User will include a list of of special prices for BEEBUG's own Archimedes software, available only to RISC User members.

Code	Product	Members Price inc.VAT
1406a	Volume 3 Special Disc	4.75
PAOM	Desktop Applications	9.95
PDA1	ArcOmnibus Games	9.95
PAS3a	ArcScan III (complete)	14.95
PAU3a	ArcScan III (upgrade)	4.75
1410a	RISC User Movie Maker	4.75
1401a	RISC User Toolbox (Arch.)	5.75
0102b	DFS reader	9.90
0104a	DFS Reader RISC OS upgrade	2.40

Code	Product	Members Price inc.VAT
0106c	Hard Disc Companion	35.00
0101d	Hearsay	51.75
0103a	Hearsay RISC OS upgrade	4.40
0107c	ISO C Dev. System	79.00
0100c	Masterfile Archimedes	16.50
0111b	Outline Font Pack 1	49.50
0108d	Ovation (Beebug DTP)	99.00
0796c	Serial Link	17.25
0105a	Serial Link RISC OS upgrade	2.40

OTHER MEMBERS OFFERS

Wherever possible we will attempt to include details here of items upon which we have negotiated a special deal. These offers will only be for a limited period while stocks are available.

Logistix

RRP £99.00

Offer price £29.95 (inc VAT) + £4.50 p&P

Logistix from Acorn is an Archimedes version of the popular PC package of the same name. Two large manuals cover its many features which include a macro language and a graph facility.

Stock Code 1984e

Twin

RRP £29.00

Offer price £18.95 (inc VAT) + £1.50 p&P

Archimedes Twin is a professional programmers' text editor and has been designed for quick and easy program development. Twin can be used with all Archimedes programming languages, including ANSI-C, Fortran 77, ISO Pascal, BASIC and Assembler. Structure templates can be created to lay out routines and procedures in the correct format for the language in use.

Stock Code 1083b

Software Developer's Toolbox

RRP £199.00

Offer price £29.95 (inc VAT) + £3.50 p&P

The Toolbox contains the Archimedes Symbolic Debugger and a set of other utilities which have proved their value at Acorn's Research and Development Centre in Cambridge. The Debugger helps trace bugs in the source code of programs written in Archimedes ANSI C, Fortran 77 and ISO Pascal.

Stock Code 0918

Genesis

RRP £86.95

Offer price £51.75 (inc VAT) + £1.50 p&P

An exciting information system of relevance to home and education. Genesis provides a framework for creating and accessing linked pages of information in a stimulating and interesting way.
As reviewed in RISC User Vol.3 No.5.

Stock Code 1900b